

THE IRON AGE

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A NEW ERA IN INDUSTRIAL RELATIONS

INDUSTRY'S trying experiences of the past eighteen months have not been without benefit.

The clouds of depression have revealed a silver lining in the form of a surprisingly general acceptance of management's responsibility for employment. Perhaps it is not too much to say that this spirit, manifested in all branches of industrial endeavor, is now announcing the coming of a new era in industrial relations.

Old time employers of 25 or 30 years ago would be astonished, could they be suddenly confronted with present day thinking of their successors. Some of them might perhaps turn over in their graves, in the belief that industry was going to the dogs. For the rule during a depression in the old days was that the employer should first look after himself and his interests and let labor do as best it could. Of course there were exceptions to the rule then just as there are exceptions now, but such was the general attitude and action.

Old timers who reflect upon past experience will agree that times have changed. In the "good old days" many a plant closed down tight when the point of vanishing profits was reached and the volume of new business was insufficient to meet the payroll and fixed charges. Those plants that remained running pruned working forces ruthlessly as well as wage rates. The scarcity of jobs was

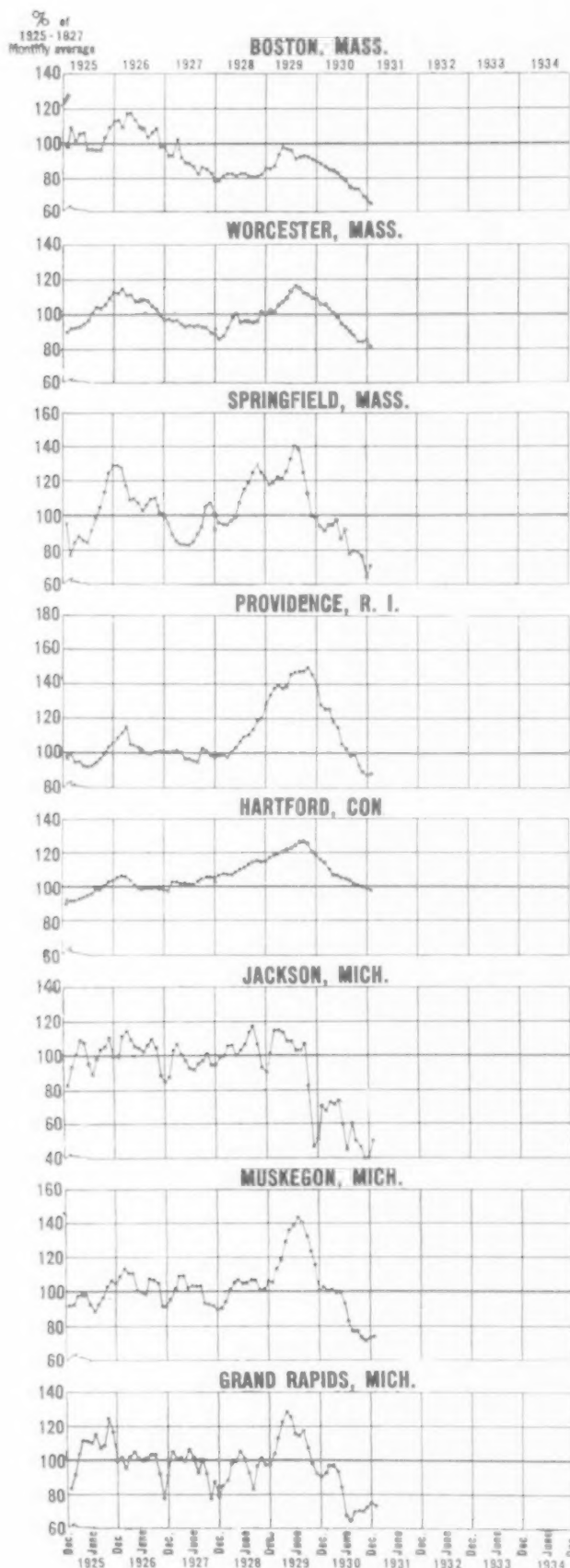
made a club to get more work out of those who remained. It was hard business. And it built animosities which bore unpalatable fruit after the emergency had passed.

During the past year many a plant has been kept open when it would have paid its owners to have applied a padlock. There have been practically no instances of labor exploitation disclosed and a most surprising and general endeavor to maintain wage rates. Discharges have not been in the ratio of decreased volume of business, but materially under it. The exact proportions cannot be known, but in many industrial centers the records show employment losses less than half, in percentage, of volume shrinkage.

As a result of this attitude of management, labor relations, in spite of the hardships of short work weeks and slim pay envelopes, are sounder than they have ever been in a like period of stress. Animosity surpluses are not being accumulated these days because labor knows that employers, as a whole, are doing all they can to mitigate conditions.

Our big men of industry are thinking and working their way toward stabilization and the avoidance of future depressions. In so doing, they are shaping the framework of a "square deal" for labor. And this sort of a square deal has no sharp corners that will hurt either party afterwards.





The volume of employment in our various metal-working centers is one of the most sensitive present-day indicators of the business trend.

CURRENT TRENDS

By JOHN H. VAN DEVENTER

Industrial Consultant—The Iron Age

Employment Forecast Depression

A STUDY of the charts of regional employment, prepared by the National Metal Trades Association, and reproduced on pages 680, 681 and 684, 685 of this issue of THE IRON AGE, indicates that employment shrinkage was evident long before the stock market crash which occurred late in October, 1929. Falling off in the number of employed in the Boston district began in March, 1929; in the Worcester, Mass., district in July; in Grand Rapids in April; in New Haven in January; in Tri-Cities in June; in Buffalo in February; in Toledo in March; in Columbus in April, and in a number of other industrial centers many months before October, 1929. Most of these declines were continuous after their beginning.

Employment volume is one of the most sensitive of our business indicators and reflects quickly any change in business volume. Unfortunately the means of obtaining a complete current picture of employment conditions throughout the country are not yet organized. It is because of this that we have such large variations in our estimates of total unemployed.

Comprehensive data of this sort would be exceptionally useful at the present time to indicate the beginning and extent of recovery. From the data now available there is evidence of an upturn in certain regions, but not of sufficiently general extent to warrant any definite conclusions. Thus, the regional charts show January gains in employment in Springfield, Mass.; Providence, R. I.; Jackson, Mich.; Muskegon, Mich.; Tri-Cities, Ill.-Iowa;

IN EMPLOYMENT

FACTS AND COMMENTS ON BUSINESS IN VARIOUS CENTERS

Wilkes-Barre, Pa.; Indianapolis, Ind.; Canton, Ohio; Fort Wayne, Ind., and Columbus, Ohio. Compared with these ten centers showing gains are 24 which reveal either losses or no gains in number employed.

It must be kept in mind that the regional charts referred to above cover the metal-working industry only. In this, the volume losses have been considerably greater than for general manufacturing as a whole.

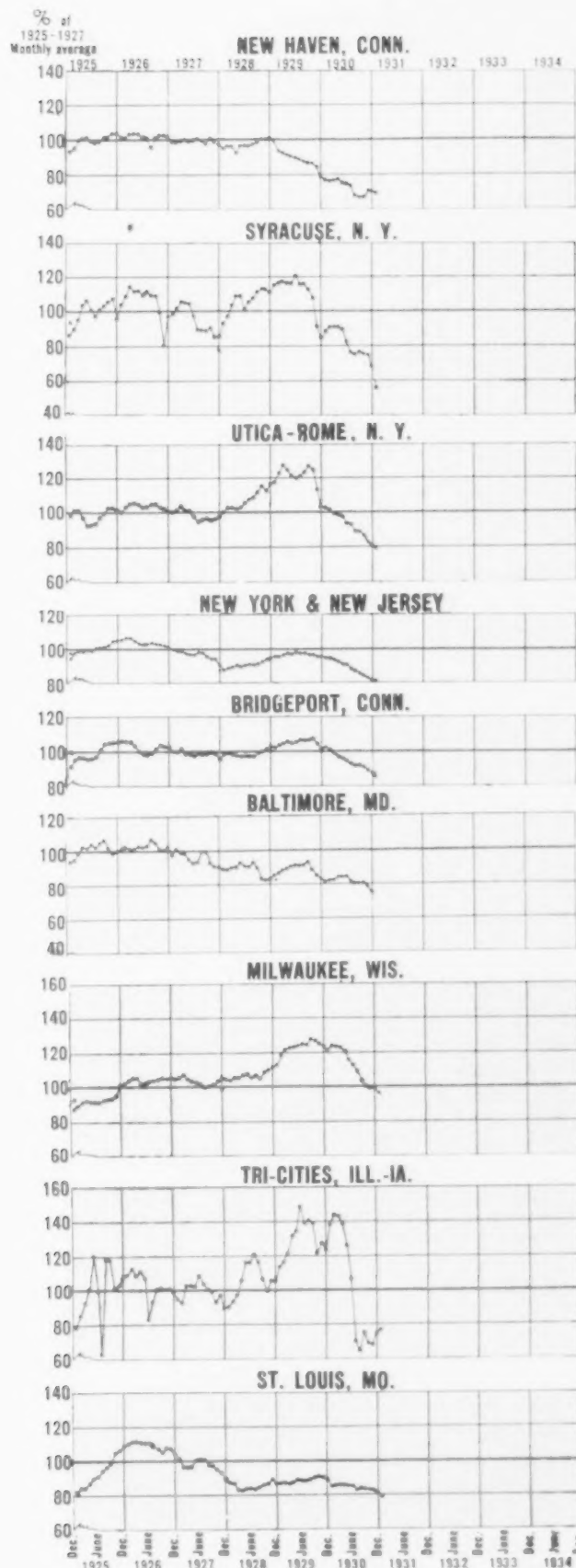
Metal-Working Industry Hit Hardest

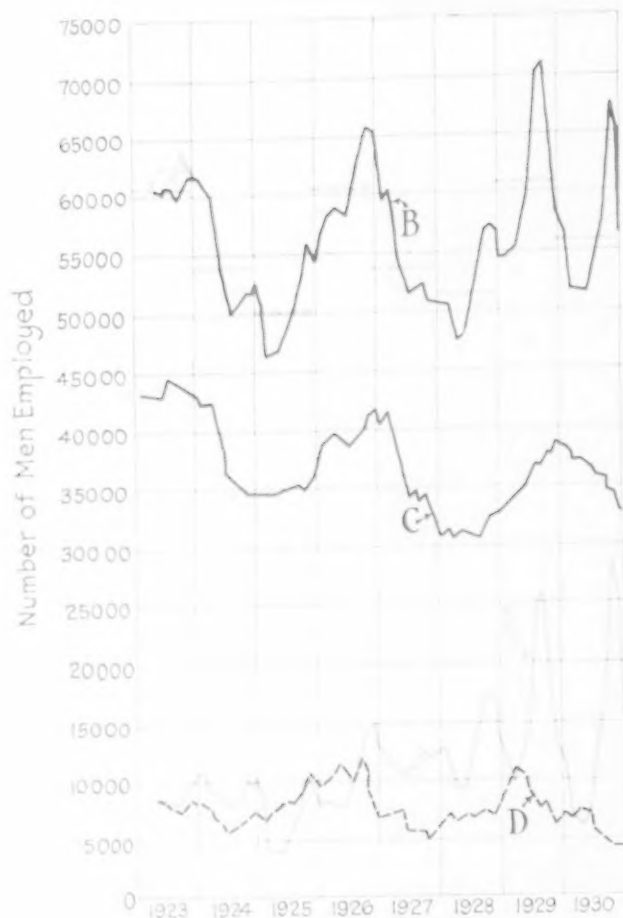
It is a characteristic of depressions that the metal-working industries suffer in volume of business considerably more than the average for industry as a whole. It is also a characteristic of recovery from depressions that the metal-working industry experiences a more than average rebound.

The fact that the current depression has been no exception to the rule is borne out by a survey made by Ernst & Ernst, of New York, in ascertaining sales and inventory declines in 644 American corporations.

Decline in sales volume in 1930 for all industries covered in the report averaged 15.12 per cent under 1929, measured in dollars of business done. The actual inventory decline averaged 17.64 per cent, but this was reduced to 5.65 per cent by considering the price factor, or increase in dollar value.

The following items, selected from the entire list





How radio helped to stabilize employment in Philadelphia is graphically shown on this chart. A—Average annual employment. B—Total employment trend. C—General foundry and metal-working trend. D—Auto accessories. E—Radio manufacturing.

of industries, represent activities commonly known as metal working:

Activity	Sales Decline from 1929	Adjusted Inventory Decline
Automobile mfg. and dealers	44.82%	28.50%
Auto parts and accessories	39.52	2.52
Electrical equipment	19.22	4.58
Foundries and forgings	25.32	12.52
Hardware	20.61	5.29
Machinery and tools	19.22	1.02
Metal products, sundry	31.75	17.70
Plumbing supplies, brass goods	28.07	8.09*
Average (metal working)	28.56%	9.15%

* (Increase)

Thus the decline in sales volume of the metal working plants is 88 per cent greater than the average decline for all industries included in the survey, and the adjusted inventory decline 62 per cent greater.

Hartford Employment Approaches Stabilization

EMPLOYMENT in the Hartford, Conn., district appears to be approaching a stabilization point from which an upturn may be expected. The Manufacturers' Association of that city main-

tains an accurate day-by-day record of the number of workers discharged and the number employed. In October, 1930, the excess of "offs" over "ons" was 900. In November this was reduced to 700, in December to 300 and in January to 12. During the first few days of February, the "ons" exceeded the "offs" for the first time in a number of months.

According to these data, representing a large part of the industry of Hartford and environs, the employment curve has finally straightened out after its long dip, and will turn upward in February unless conditions change unexpectedly.

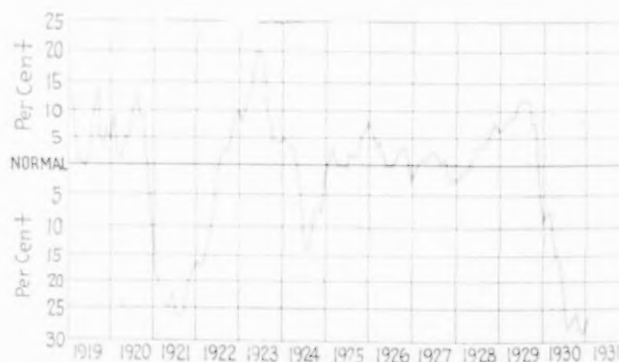
Springfield, Mass., and Providence, R. I., are two other New England industrial centers which show employment upturns in January, according to the National Metal Trades Association.

Radio an Employment Stabilizer

THE importance of new products of the "luxury" type in promoting prosperity is demonstrated by Philadelphia's radio industry. The accompanying chart, from the Metal Manufacturers' Association of Philadelphia, shows that radio manufacturing, in this district, was a substantial factor in mitigating unemployment. As a result of activity in this line, the average total employment in the Philadelphia district, among 107 firms representing approximately 71 per cent of the local metal-working industry, was but 8 per cent under 1929, and was above the years 1924, 1925, 1927 and 1928. This applies to the number of workers employed, but not to man-hours worked.

Observe that during the peak of 1930, some 2500 more people were employed in radio manufacture than during the peak of 1929. This does not substantiate the belief that people stop buying luxuries in hard times. As a matter of fact, the demand for something that people could quite easily do without was sufficient more than to offset the employment loss in the older metal-working industries.

Along the same line, it is interesting to note that electrical refrigerators led the procession of



Connecticut business volume, as reported by the Manufacturers' Association of that State, shows a continuation of the decline through January.

American products making gains last year in export markets. A substantial increase was registered, in spite of the general decrease in exports as a whole.

We need more desirable new products of the "luxury" type. They seem to be depression-proof, both at home and abroad.

Third Month of Increase for Dayton

ACCORDING to the association for Dayton, January is the third consecutive month in which this Ohio manufacturing center shows an employment increase. The chart which is reproduced here shows that the employment level is now not far below that of 1928, although some of the 43,000 employees are working on a part-time basis. Employment, according to Charles H. Paul, director of the association, is still 15 to 20 per cent below what might be considered normal.

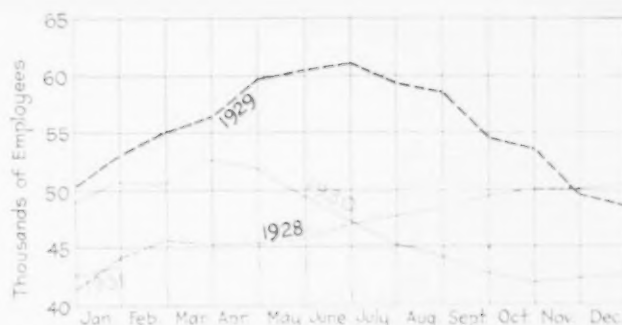
"There seems to be a general feeling," states Mr. Paul, "that the bottom has been reached and that we are now approaching a general turn upward in activity. This will probably be slow and irregular until it has established itself in the minds of the public. As far as we can learn, Dayton's record for the last three months is more favorable than of other cities in its class, either in Ohio, or over the country as a whole."

Bridgeport on 1926 Employment Level

VOLUME of employment in Bridgeport, Conn., measured in number of workers employed during January, 1931, was approximately on the same level as the 1926 average. According to the Bridgeport Manufacturers' Association, and based on data supplied by 30 selected factories, there was an average of 13,150 employees during January of this year, as contrasted with 13,749 for 1926. Man-hours in 1926 however averaged 669,000 per week, as against 460,000 for the last month. Average factory hours per week averaged 49 in 1926, as against 36 in January, 1931. This is another instance of the fact that industry is cushioning the effect of the depression by maintaining employment levels considerably above the level of business volume.

Employment Keeps Ahead of Man-Hours

MAN-HOURS in Connecticut industries in 1930, according to the Connecticut Manufacturers' Association, were 26 per cent below the corresponding period in 1929. The above decrease in employment throughout the State, however, was about 14 per cent. This means that the



In Dayton, Ohio, according to the Association for Dayton, employment has been increasing for the last three months.

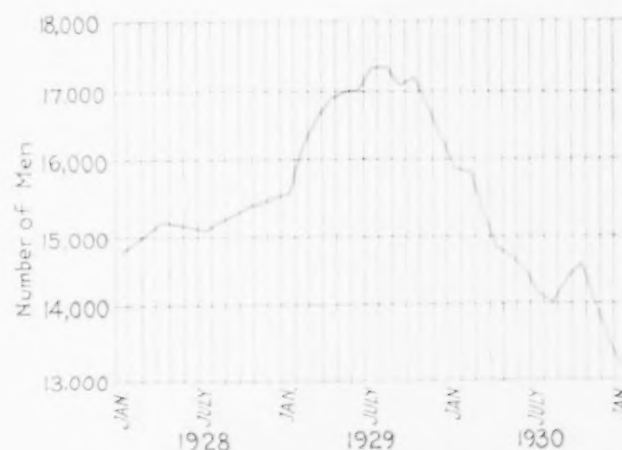
decline in man-hours was nearly twice as sharp as that in the number of employees.

According to E. Kent Hubbard, president of the Connecticut association, this discrepancy means that industry has been very generally working for the welfare of the employees. "These man-hours" (even in their reduced amount), says Mr. Hubbard, "represent a great deal of factory work that need not have been done, if it were not for the manufacturers' desire to soften the harsh working of economic law. The historian of this depression must take cognizance of the fact that industry assumed a generous share of nursing a sick world through a crisis and that it did the job as a spontaneous gesture without prompting by external influence."

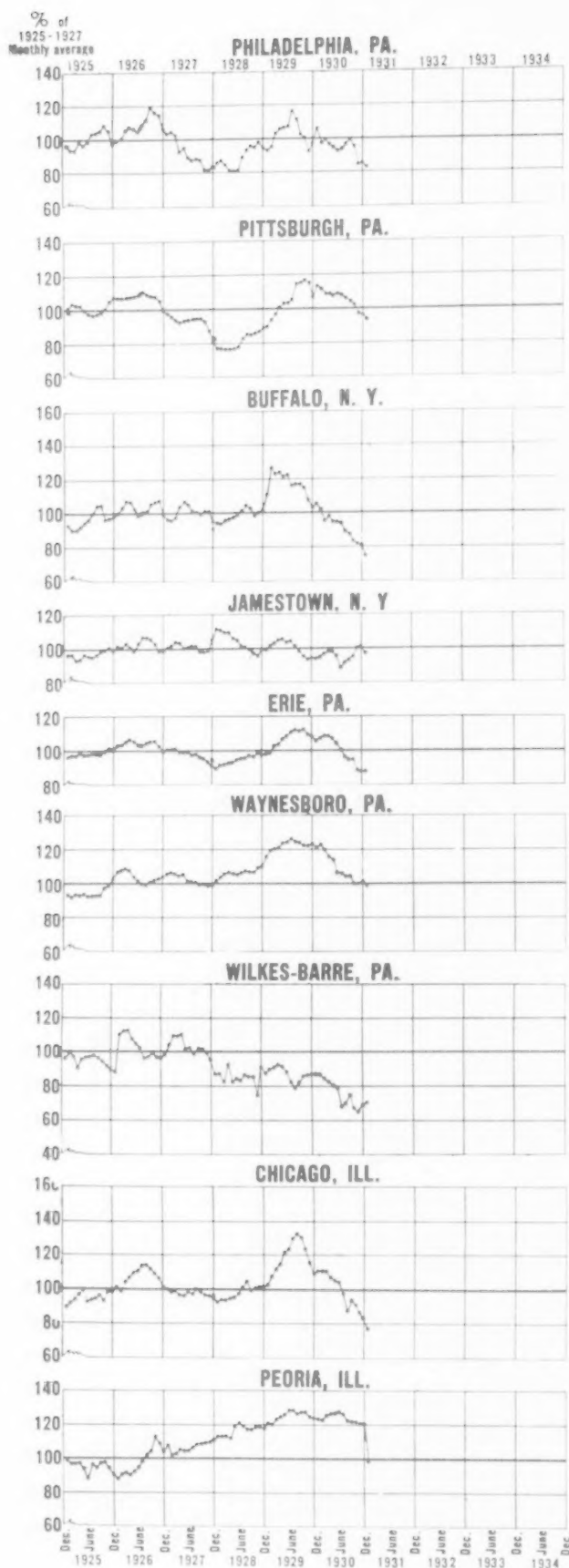
Nut and Bolt Companies Spread Employment

A SIMILAR condition in which employment volume is maintained at levels considerably higher than sales volume is reported by Charles J. Graham, president of the Bolt, Nut and Rivet Manufacturers' Association of Pittsburgh. This body is working in cooperation with Colonel Woods' Emergency Employment Committee.

"The bolt, nut and rivet manufacturers," states Mr. Graham, "have been working as a unit through-



Employment volume, according to the Manufacturers' Association of Bridgeport, Conn., continued to decline in February, but kept ahead of man-hours.



According to these and the preceding charts of the National Metal Trades Association, ten industrial centers revealed gains in employment in February, but twenty-four show either losses or no gains.

out the business depression to lighten, in so far as possible, the results of decreased output which are being felt by our workers in individual plants. For the past year our business has been declining, and only recently has partial improvement begun to set in. Some of our member companies have been operating at as low as 25 per cent of normal capacity.

"To meet this situation, our association has stressed repeatedly the need for careful planning among member firms in order that as many employees as possible be carried through the employment crisis. Concerted action by these firms has shown a keen realization of responsibility to employees and to the nation.

"The principal method of stabilizing employment has been to reduce weekly or daily hours and to distribute available work among all employees. In this way we are carrying on part time probably twice as many employees than if we were operating full time with reduced forces. Although this means reduced income for all workers, no case has been reported where unit wage rates have been cut. Office personnel has, in general, been maintained at normal strength or nearly so."

Cincinnati Employment Decreases

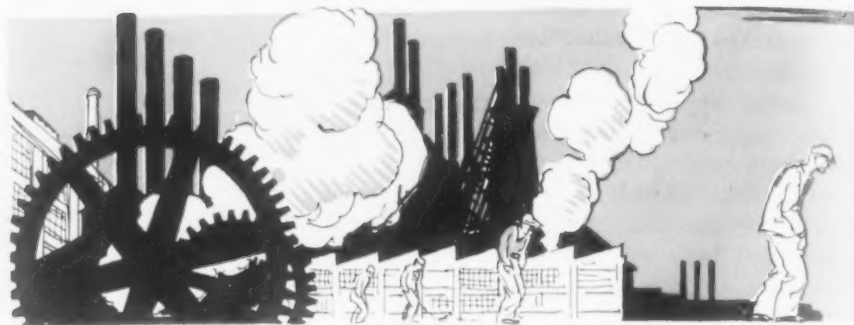
THE Bureau of Business Research, Ohio State University, reports decreases in the number employed in Cincinnati during January. In manufacturing, employment was 3 per cent less in January than in December, and 13 per cent less than in January, 1930. Construction employment in January was 22 per cent under December, and 14 per cent under January, 1930. Non-manufacturing employment in the Cincinnati district was 8 per cent less than in December, and 5 per cent less than the previous January.

The Department of Public Welfare of Cincinnati reports a total of 20,000 unemployed during January, which is larger than for any previous month of the depression.

New England Recognizes Need Of Employment Data

RECOGNIZING the need of basic employment records to enable industry to cope with the recurring problems of unemployment, the industrial committee of the New England Council has recommended that steps be taken at once to secure accurate data.

"The time has come to urge all employers of labor in New England to give attention to the long-time problems of unemployment," states the committee. "We, therefore, urge that every employer develop, at once, a system of records that will show the precise effect that the present depression has had and is having upon weekly hours of labor of each of their employees. This information, if accurately recorded, will serve as basic data for intelli-



Developments in Industrial

ALTHOUGH pension plans were established in American industry as long ago as the 1870's, the main development has occurred within the last 30 years. Most of the earlier plans were on railroads, and in point of number of employees covered the railroad pension plans are still the most important group. In the last 20 years, however, manufacturing has been coming rapidly to the front,

Under the composite type of plan the employer promises a certain annuity which is increased if the employee elects also to contribute.

THIS is a summary of recent developments in formal industrial pension plans, as discussed by the author at the Sept. 18, 1930, meeting of the National Industrial Conference Board.

At least 450 formal pension plans are now in operation in American industry, covering approximately 4,000,000 employees. The total number of pensioners, as of Jan. 1, 1930, was about 95,000. Pension payments for this year will amount to between \$55,000,000 and \$60,000,000, exclusive of those made under informal plans for which sufficient data are unobtainable.

The trend, during the past five years, has been increasingly toward the contributory or composite type of plan, and also toward guaranteeing payments to the pensioner for life. The financial aspect of pension plans is being constantly improved, the trend being toward an approach to sound actuarial practice.

though in proportion to the size of the group it has been exceeded by public utilities, chiefly because all the important cable, telephone and telegraph companies have organized pension systems. The number of pension plans, together with the approximate number of persons covered, classified between non-contributory and contributory and composite plans, is shown in Table I.

Data as to number of employees were not available for 39 plans. Moreover, several plans known to have been recently installed have not yet been made public. Though we have made every effort to get a record of every pension plan in the United States and Canada it is not improbable that some have not been found. On the whole, it is reasonable to estimate that there are now at least 450 formal pension plans in operation and possibly more and that the coverage of employees is about 4,000,000, despite declines in employment in railroads and manufacturing.

Reversal of Trend in Type of Plan

Although the contributory plans form at the present time less than 30 per cent of the total number of plans and the employees covered under contributory and composite¹ plans only 6.2 per cent of the total number of employees covered, there has been a definite trend toward the contributory type of plan in the last few years. In the period prior to 1900 six out of ten, or 60 per cent, of the plans established took the non-contributory form. The companies establishing the contributory plans were small, most of them being banks, and employees covered under contributory plans were probably not more than 2 per cent of the total numbers involved. The proportion of contributory plans to total plans established between 1901 and 1905 was only about 15 per cent, although the proportion measured by number of employees remained about the same as in the period prior to 1900.

The tendency on the whole prior to 1920 was toward a decline in relative number of contributory plans es-



Pension Plans

By A. H. YOUNG

Industrial Relations Counselors, Inc.

established, though the proportionate number of employees covered under contributory plans as compared with the total tended to increase slightly. By 1920 the proportion of contributory plans to the total was still less than 15 per cent and the proportion of employees covered by contributory plans about 3 per cent of the total. In the period from 1921 to 1925, however, over 23 per cent of the new plans established were either contributory or composite, while in the period since 1926, almost five years, of the 85 newly established plans of which we have record, no less than 64, or over 75 per cent, took either the contributory or composite form. Moreover, four plans which had been established previously as non-contributory were changed either to the contributory or composite form in this period. The companies establishing contributory plans on the whole still tend to be fairly small; though 75 per cent of the plans established since 1926 took either the contributory or composite form, they applied to only 19.9 per cent of the employees covered by all new plans established in that period. If, however, to the plans newly established there be added those in which the form of plans has been changed, the proportion of employees newly covered under contributory plans to the total number of employees involved in the last five years is 43.2 per cent. There is thus quite a definite shift in the direction of the contributory form of pension plans.

Two important companies, the General Electric and Eastman Kodak, have adopted or revised plans which might be classified as semi-contributory. The former company levies contributions. Employee accumulations may, however, be taken in cash or stock rather than an annuity, so that it is a combination of a non-contributory pension plan and a savings plan. Eastman reduced the employee bonus to pay for the pension and for this reason some students have argued that it is a contributory plan. The company, itself, however, regards it as non-contributory and we have so classified it.

This burst of activity in the contributory pension field is quite closely connected with the activities of insurance companies. Of the 118 contributory and composite pension plans now in effect, 75 are reinsured and managed for the most part by insurance companies, while of the 302 non-contributory plans now operating, only four are either partially or totally reinsured.

Moreover, most of the insurance activity has come within the last few years. Prior to 1916 only one plan was reinsured. In the period 1916 to 1920, one of the 17 contributory and composite plans was reinsured, in the period 1921 to 1925, nine of 17, and in 1926 to 1929, 63 of 64. In the last period also three of the four plans which changed from the non-contributory to the contributory or composite form changed also from the non-insured to reinsured type of plan. Insurance companies prefer to carry contributory or composite plans rather than the non-contributory type. Only four of the 302 such plans are reinsured and two of these carry insurance only after pensions have been granted. So strong has the trend toward contributory plans become that so far as we have been able to determine, all of the plans established in 1930 took either the contributory or the com-



posite form and all but three in 1929; thus the insurance companies have played a large part in the changed trend in the form of industrial pension systems.

Financial Aspects Being Constantly Strengthened

There has been a growing tendency to strengthen the financial side of industrial pension plans in recent years. Part of this strengthening is a result of the fact that most of the new plans have been reinsured with insurance companies which, in the first place, are unwilling to take plans in which the pension is based on the final salary and which, in the second place, require the payment of an annual premium related to determinable actuarial factors for the current year. There has, however, been a considerable strengthening of the non-insured plans, particularly in non-contributory field. One evidence of this lies in the growth of the number of plans which have sought actuarial assistance in the financing of their systems, as well as increase in the number of plans which have provided funds.

The last previous comprehensive study covering this point was made by the National Industrial Conference Board published in November, 1925. At that time, of 213 companies for whom data were available only 36, or 16.9 per cent, were reported as actuarial. On the other hand, in the present Industrial Relations Counselors' study of 325 plans for which data were available, 191, or 58.8 per cent, were reported as actuarial. In the N. I. C. B. study, of 221 plans, 85, or 38.5 per cent, were said to be funded, whereas out of 384 companies for which I. R. C. has collected data, 226, or 58.8 per cent, may be so classified; 11.3 per cent of the firms reporting to the N. I. C. B. in 1925 were reported as both actuarial and funded, as compared with 158, or 48.2 per cent, of the firms reporting to I. R. C.

A considerable part of the gain, of course, has been caused by the establishment of new plans since the N. I. C. B. study was made, but there has also been a gain in the older plans, as can be seen from the third section of the more detailed tabulation shown in Table II.

Should progress in funding continue at the rate of the past five years for another 10 or 15 years, it appears quite possible that substantially all of the plans at present in existence would have at least made a beginning toward sound actuarial and financial practice, though it would be unlikely that the liabilities would be completely funded for any such period.

There are also other indications that the financial side is being improved rapidly. Data collected from 88 companies as of the first of 1928 showed funds for these companies from Jan. 1, 1928, of over \$200,000,000. It was estimated at that time that total funds already set aside for pensions were between \$250,000,000 and \$300,000,000.

Growth of Pension Funds Since 1920

It has been possible to trace the growth of funds in 17 of these companies now employing 715,000 persons since 1920. In that year over 10 of the 17 had begun to make provision for future pension payments. The amount of funds previously set aside was slightly under \$21,000,000. By the beginning of 1925, 12 companies had begun funding operations and the total reserves were \$51,000,000. On Jan. 1, 1928, 15 companies of the 17 had adopted funding policy and the total funds amounted to about \$115,000,000. On Jan. 1, 1930, the funds in hand for the 17 companies totaled \$220,400,000. Thus, in 1930 total funds in hand were 10.5 times as much as ten years previously and had increased 90 per cent in two years. The record of these 17 companies could scarcely be cited as typical, but it portrays vividly the process which has been going on in the last few years in strengthening the foundations of industrial pension systems. The figures quoted include no reinsured plans. An actuary of one of the leading insurance companies recently estimated that at the first of the year the companies which carried group annuity business had in hand some \$75,000,000 in respect of that business. This included some group annuity contracts outside the field of industrial pensions, but it is probably safe to estimate total reserves carried by insurance companies for industrial pension systems at \$70,000,000.

It seems on the whole that a conservative estimate of total funds now in hand for payment of future pensions would range between \$425,000,000 and \$450,000,000. Of this amount from 70 to 75 per cent is either in trust funds or carried by insurance companies.

These estimates include only one small reserve for railroad companies. Interstate Commerce Commission regulations prior to the end of 1928 were such as practically to prohibit accumulation of pension reserves by railroad companies, and even now the situation is so far from being clear that no railroad has yet been willing to adopt the full funding program. Substantially all the reserves in hand, therefore, apply to the companies outside the railroad field. One would

TABLE I

	Number of Plans			Number of Employees Covered		
	Non-Contributory	Contributory and Composite	Total	Non-Contributory	Contributory and Composite	Total
Steam railroads	47	1	48	1,562,128	10,500	1,572,628
Public utilities	64	9	73	666,186	28,889	695,075
Manufacturing	134	44	178	1,162,046	127,598	1,289,644
Banking and insurance	34	44	78	71,649	49,732	121,381
Miscellaneous	23	20	43	58,035	15,996	74,031
Total	302	118	420	3,520,044	232,715	3,752,759

TABLE II
Comparison of Pension Plan Studies

	National Industrial Conference Board		Industrial Relations Counselors	
	Number	Per Cent	Number	Per Cent
Reported as actuarial	36	16.9	191	58.8
Reported as non-actuarial	177	83.1	134	41.2
Total	213	100.0	325	100.0
Reported as funded	85	38.5	226	58.8
Reported as not funded	136	61.5	158	41.2
Total	221	100.0	384	100.0
Reported as actuarial and funded	24	11.3	158	49.2
Reported as actuarial but not funded	12	5.6	32	10.0
Reported as non-actuarial and funded	55	25.8	34	10.6
Reported as non-actuarial but not funded	122	57.3	97	30.2
Total	213	100.0	321	100.0

be safe in estimating that the liabilities of companies outside of railroads on the whole are from 25 per cent to 33 per cent fully covered.

Indefinite Maintenance of Plans Not Guaranteed

While the provision made for accumulating funds indicates that many companies which maintain pension plans regard them as permanent and are endeavoring to finance them on a permanent basis, nevertheless no company has committed itself to the indefinite maintenance of such plans. Indeed, the majority of companies specifically reserve the right to revoke or amend the plan at any time on no or short notice. Even where trust funds have been established, the trust is revocable upon termination of the plan and the money usually reverts to the company. In a few cases, however, covering a large number of employees, the company undertakes to reserve such funds for the purpose of paying pensions only and in one or two cases the money reverts to the company only after annuities have been purchased for certain employees.

In a number of cases the revocation of the plan, however, is restricted as regards persons already on the pension roll. In 55 companies the pension once granted is guaranteed for the life of the pensioner by the company and is not affected by subsequent changes in plan. In 22 plans the payment of pensions once granted is guaranteed to the extent of accumulated funds or reserves. In 73 other companies the payment of the pension is guaranteed by the insurance company, and in such cases, of course, payment of the pension is not started unless the insurance company has funds in hand. In all, 150 companies, or about 36 per cent of the total, guarantee in one form or another the continuance of pension payments for the life of the pensioner.

Here again the trend is sharply toward using guarantees. This trend is partly due to the establishment of insured plans which guarantee payment of pension once it has been granted. But it is also true that several companies have either made guarantees for the first time or have changed existing guarantees to extent of funds to a guarantee by the company, after a full funding program has been in effect for a sufficient period of time to insure adequate funds for the future. Thus, despite the fact that only a minority of plans at present have been willing to make any

guarantees, the trend is strongly in the other direction.

It may finally be noted that the rate of increase in the number of pensioners and pension payments has been such as to cause rapid increase in pension expenditures. In the railroads, for example, the rate of increase in the number of pensioners for the 28 years ended in 1928 has been 11.9 and in the amount of payments the increase has averaged 18.3 per cent per annum.

It seems probable that the total number of all pensioners under formal plans on Jan. 1, 1930, was about 95,000. The amount of pension payments in 1930 will run between \$55,000,000 and \$60,000,000. This excludes pensioners and payments made in informal pension plans for which data have been insufficient to make any estimate.

Light Aluminum Alloy in Textile Machinery

OF the light metal alloys as a means of decreasing dead weight and improving workability or other properties of metal for machine parts, alloys of aluminum are much used in the textile industry but magnesium alloys are not. The subject, "Light Metals in Textile Machinery," is discussed by Ernst Blau in *Melliand Textiberichte* for April, 1930. According to an abstract published in *Chemical and Metallurgical Engineering*, light alloy castings are much in use, with preference for sand castings when few like pieces are to be made, mold castings for quantity production of medium or large pieces, and spray castings for quantity production of small pieces.

One of the leading alloys for textile machinery is Silumin (known in France and England as Alpax). Its casting properties permit use of thinner-walled pieces than with any other alloy. Silumin has been successfully adapted to production of housings, bearings, pulleys, brake drums, fan blades, bleaching and dyeing apparatus, perforated tubes, washing machine parts, and the like. By suitable heat treatments or mechanical working, tensile strength and other mechanical properties of silumin and like alloys can be greatly improved.

Methods for Scheduling Plant

PLANT maintenance, important and vital as it is, is often overlooked in the scheme of unified plans and schedules for getting work done. In the operating or production departments there are always methods for scheduling work, but in the construction and maintenance departments this situation is the exception rather than the rule in factories.

Yet engineers, plant superintendents and maintenance foremen are not unappreciative of the reasons for putting schedule methods into effect in their work.

The economies to be derived are very important. The urgency of a particular job necessitates a schedule. The value of the coordination of the work pertaining to one or more than one job is immeasurable. The necessity of eliminating, or at least reducing to a minimum, the possible delays to production stands out almost paramount to all.

Maintenance or construction work can be planned and scheduled by means of a system which may be of a simple skeleton form in the small organization or possibly a division of a highly developed production control department in a very large organization. But whatever the policy or methods of carrying on work, there should be some sort of a "forward picture" of future work to be done. Hence a definite list of jobs or pieces of work to be done should be made up for both maintenance and construction. These jobs should be indexed and then scheduled, using present available man-hour capacity.

The best way to do this is by means of a control board with a section for each group of workers. In this way electrical maintenance would have one section, millwrights another, carpenters another, etc. By having definite working periods available capacity could always be seen and each new job could be fitted into the existing program or summary schedule.

A Simple Plan for Scheduling Maintenance

A very simple method and one that is useful both for large and small forces is shown on the control board schedule, Fig. 1. In all cases each group of workers would be scheduled on one section of this board. The use of this board is very simple. In the usual case—for example, a small electrical repair shop—the name of the workman would go in the column "Name"; under "Work to Be Done" would appear the function of work (for example, "rewind field coils"); for the dates would be given the time allowance, indicated by a small card which would be labeled by work order number and, in case of a fractional day, by the number of hours. This card would be inserted between two horizontal wires directly opposite the "Name" and

NAME	WORK TO BE DONE	JANUARY													
		1st							2nd						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
ELECTRIC REPAIR SHOP															
NAME															

FIG. 1.—Control board used for scheduling maintenance work.

FIG. 3.—Sample work order form.

M ——— WORK ORDER				M ——— SCHEDULE		
EST. COST \$50.00		DATE 4/11				
WORK TO BE DONE	ASSIGNMENT	DAY	HOUR	WORK TO BE DONE	START	COMPLETE
					DAY AND HOUR	DAY AND HOUR

(FACE)

(REVERSE)

Maintenance

By WALDO HUTCHINSON

"Work to Be Done." In the larger organization it would be sometimes advisable to replace the name of the worker with that of a group of workers or possibly of a foreman.

The control board would indicate at all times the available capacity, would show clearly the individual jobs assigned to each person or group of persons, and how much current time is available for new work. Also, it would readily show the scheduled starting and completion dates. It is simply a condition report set up in schedule form.

In order that the control board will be most useful and most accurate, two other requirements are necessary. The first of these is in the use of a proper "work record." The form is shown in Fig. 2. Fundamentally this is a record of the job and also gives the supporting data necessary to the proper operation of the control board. Under the proper columns can be seen the various functions, the corresponding quantities of work, unit time elements, total man-hours, and names of persons or group of workers to whom the particular function is assigned. The man-hours and assignment will be secured or set up either by the person maintaining the record or by the foreman, preferably the latter in the small organization. In either case, of course, the assignment would be made after due reference to the control board; otherwise it would be some form of a good guess and render useless the operation of the board.

The supporting information required for this record, and obviously for the proper operation of the con-

THE "forward picture" of work to be done is the chief object of modern production scheduling. Once obtained, it simplifies planning, affords control of costs and steps up production efficiency.

Maintenance and repair scheduling is a more recent development of good management, but equally important in its field and function. Failure to get the "forward picture" of maintenance work results in confusion, high costs and possible shutdowns with their attendant expenses.

trol board, should be developed by means of some form of job standardization. In the very simple case a formal record should be established of time elements required to perform each function. In the more elaborate record, data should be collected on the time elements for fundamental operations or motions. These when totaled would give the schedule time allowance. In any case these data should be indexed and filed properly according to some system which can be improved and built up as additional data are obtained.

The second requirement for the proper operation of the control board is a satisfactory work authori-

(Concluded on page 756)

FIG. 2.—Record of construction work orders issued.

[illegible]

TENSION TESTING AS A

By ROBERT L. CERUSO

Research Staff, Bell Telephone
Laboratories, New York

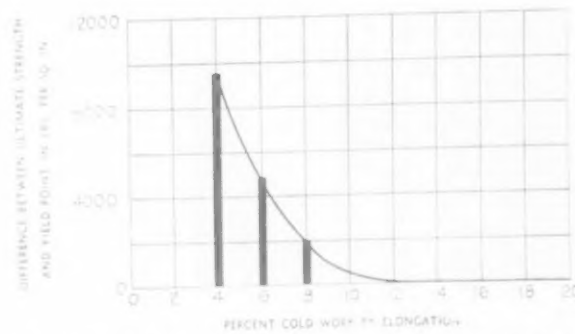


Fig. 1.—Difference between ultimate strength and yield point due to various degrees of cold work after annealing at 100 deg. C.

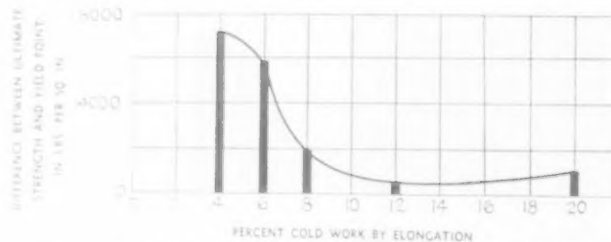


Fig. 2.—Difference between ultimate strength and yield point due to various degrees of cold work followed by annealing at 200 deg. C.

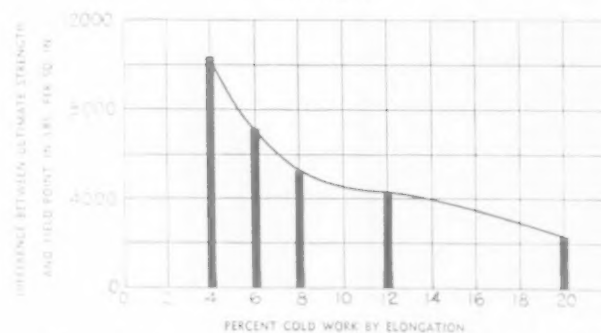


Fig. 3.—Difference between ultimate strength and yield point due to various degrees of cold work followed by annealing at 300 deg. C.

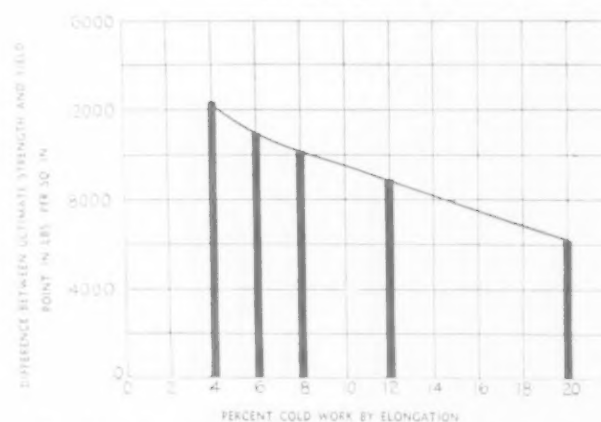


Fig. 4.—Difference between ultimate strength and yield point due to various degrees of cold work followed by annealing at 400 deg. C.

THE tension test today is accepted by engineers as furnishing satisfactory and fundamental indications of the quality of structural material.

At times it is supplemented by the Brinell and Rockwell tests and, in cases where shock absorbing information is desired, impact tests on notched specimens are widely used. The value of the tension test has often been questioned. Some argue that, since the material is subjected to simple tension, the test is not a true criterion of the "strength" of the material in service where it is subjected to a complicated system of forces. On the other hand, it can be shown that the tension test does involve complicated stress distribution.

Tension tests involve such terms as elastic limit, proportional limit, yield point, ultimate strength, elongation and reduction of area. The first four terms are specifically accepted as being related to the strength of the material, whereas the last two, elongation and reduction of area, are measures of ductility. The value of elongation and reduction of area as measures of ductility is today being seriously considered. As a matter of fact, they are now being associated with plastic changes of length, such as in the tensile test and wire drawing.

True Meaning of Yield Point

Although most of the above terms are defined, their real significance is not fully understood. The question frequently arises, what is the true meaning of the yield point? It is known that, when the yield stress is reached, plastic flow results with the consequent appearance of permanent slip within the crystals. Because of the irregular orientation of the crystals, slip does not occur simultaneously in all crystals. In fact, those crystals slip first which are favorably situated in regard to resisting the shear stress developed in tension. This feature, as well as the process of hardening which occurs in deformed crystals, accounts for the fluctuation in stress due to yield and the higher loads at which the specimen breaks.

MEASURE OF BRITTLENESS

ENSION tests are used to obtain various findings—elastic limit, proportional limit, yield point, ultimate strength, elongation and reduction of area. Latterly there has been disagreement as to the interpretation of these tests. The value of elongation and reduction of area as a measure of ductility is being challenged. Ultimate strength has been found to be only an approximate measure of the cohesive strength of brittle materials. When the yield point is raised even slightly to approach the ultimate strength, loss of toughness may be expected. In a normally tough material brittleness will immediately develop if ability to withstand tearing and resistance to shear are reduced even by a small amount.

Noteworthy contributions concerning the yield point and its significance have been made by Ludwik, Moser, Sachs (a) and Koster—all German investigators. They discovered that the resistance of a material to alternating stress depends mostly upon its resistance to distortion (hardness and yield point) rather than upon the ease of working, such as elongation and reduction of area. These latter properties are not standards by the use of which failure from fatigue can be avoided. In fact, Dr. Ludwik maintains that the values of elongation, reduction of area and ultimate strength are not trustworthy indications of the probable behavior of a metal under stress.

For brittle materials the ultimate tensile strength is only an approximate measure of the cohesive strength of the substance. Since deformation (even if slight) has taken place prior to failure, it thus becomes no criterion of the unstrained metal, especially in regard to the intercrystalline cohesion. Therefore, it may be stated that, whenever a substance possesses a low cohesive strength in comparison with resistance to deformation, the material is brittle and when tested by impact will be accompanied by a low value.

Resistance to Tear and Shear Important

In summarizing these considerations, it becomes apparent therefore that the relative magnitudes of the cohesion and internal friction, or, in other words, of the ability to withstand tearing and resistance to shear, have a very important bearing on the brittleness of a material. In a normally tough material, brittleness will immediately ensue if the relationship between these two properties is lessened even by a small amount from a certain limiting value.

In considering the results obtained in a former investigation involving the change in properties of a normally tough mild steel it was observed that, when this steel was subjected to various treatments, the yield point was raised, approaching the ultimate tensile strength. It was moreover found that, with the ap-

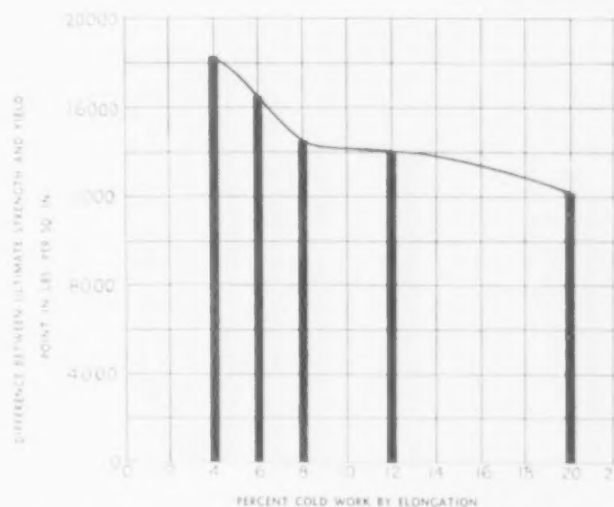


Fig. 5—Difference between ultimate strength and yield point due to various degrees of cold work followed by annealing at 500 deg. C.

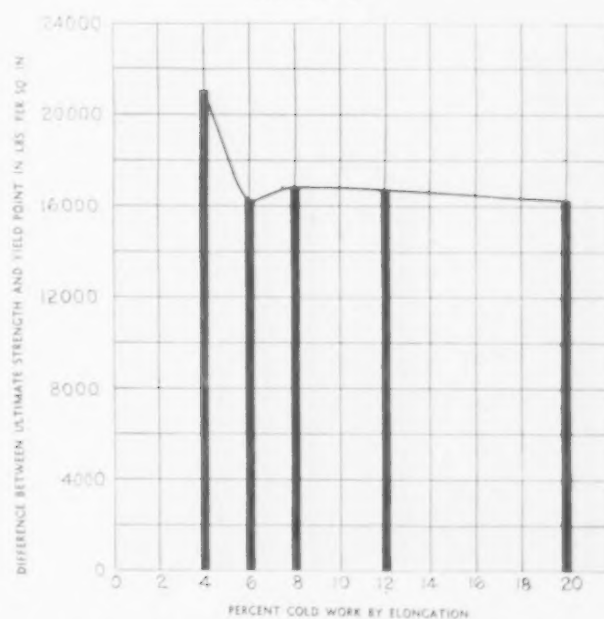
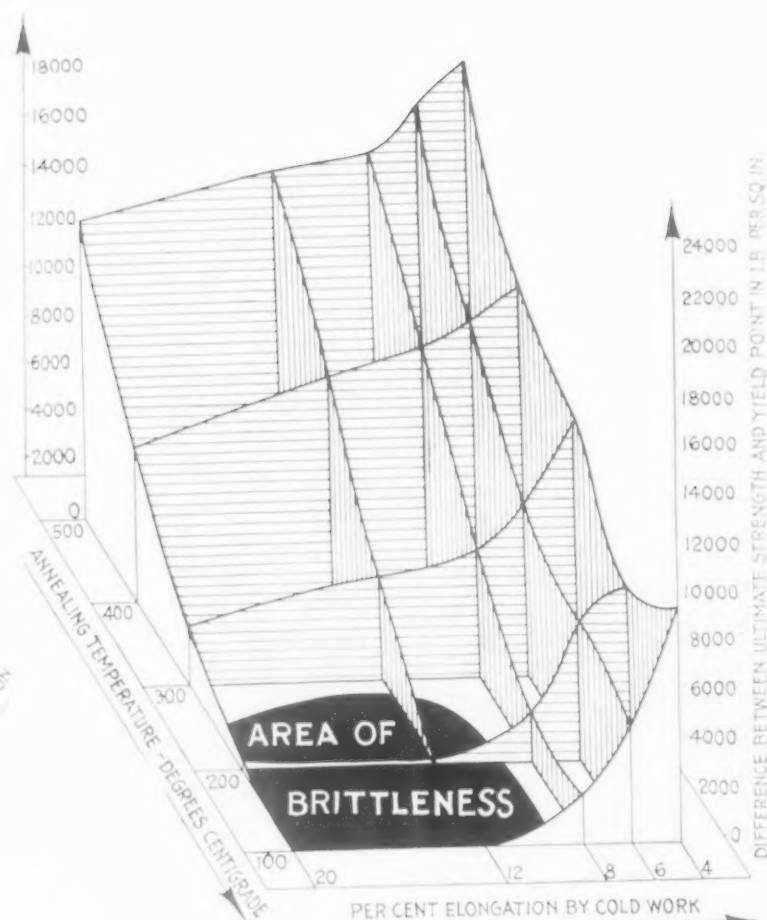
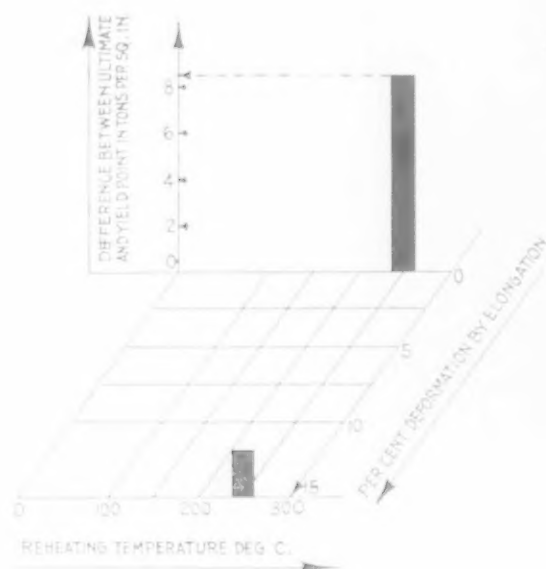


Fig. 6—Difference between ultimate strength and yield point due to various degrees of cold work followed by annealing at 600 deg. C.

(a) W. Kuntze and G. Sachs, "Practical Significance of the Yield Point," *Zeitschrift des Vereins Deutscher Ingenieure*, July 21, 1928.

FIG. 7.—The relation between yield point and ultimate strength as affected by cold work followed by annealing (below).

FIG. 8.—Differences between the ultimate strength and yield point due to various degrees of cold work and followed by annealing at different temperatures (at right).



proach of this condition, the material began to show low notched-bar impact strength. If a low notched-bar impact strength is a criterion for lack of toughness, then it may be pointed out that, whenever the relationship between the yield point and ultimate strength is altered without undergoing a change in structure, the toughness of the material has altered.

A distinctive method of disclosing this relationship is clearly shown in Figs. 1 to 6. The difference between the ultimate strength and the yield point, due to various degrees of cold work followed by annealing at different temperatures, has been plotted. These figures show that the relative cohesive strength and shearing strength are gradually approaching a certain limiting value. In fact, it is expected that, when the resistance of a material to shear becomes as great as its resistance in tension, that substance exhibits brittleness; otherwise a considerable degree of deformation or change of shape would follow under the acting stresses long before rupture occurs. Therefore, a reasonably low shearing strength in comparison with cohesive strength is a measure of toughness.

Properties Long Overlooked Revealed by Tensile Test

The tension test therefore brings out certain features regarding the properties of a material long over-

looked. It is found by a close study of both the yield point and ultimate strength that when the yield point approaches the ultimate strength, even by a small amount, loss of toughness in that material may be expected. Furthermore, if the yield point practically disappears, then a condition for minimum toughness has been satisfied.

Fig. 2 shows how a steel loses a considerable amount of toughness when cold worked from 10 to 20 per cent prior to annealing at 100 and 200 deg. C. Indeed it has developed a considerable amount of brittleness. A study of the other curves shows somewhat similar features.

Just recently, Bolsover (b) discovered that mild steel (0.14 per cent carbon) becomes brittle, as measured by the impact test, when cold worked by elongation 10 to 15 per cent prior to annealing at 250 deg. C. for 30 min. In his work Bolsover has made some tensile tests, the results of which have been utilized to form the sketch in Fig. 7. Here it is immediately apparent that the difference between the ultimate strength and the yield point becomes less and less with the increase in the brittleness of this steel. This is a further verification of the feature pointed out.

Finally, employing the method shown in Fig. 8, it is discovered that, whenever 0.22 per cent carbon steel is cold-worked from 10 to 20 per cent prior to anneal-

(a) Bolsover, G. R., "Brittleness in Mild Steel," *Iron and Coal Trades Review*, May, 1929.

ing at from 150 to 250 deg. C., brittleness is imparted. This area is labeled "Area of Brittleness" in Fig. 8.

General Discussion

Any laws or rules which may be enunciated predicting when a normally tough material becomes brittle are of great importance. In order to draw conclusions it is necessary to compile the fundamental properties of such substances. In this respect, the only substances which normally exhibit a yield point are:

- 1.—Purest available iron, steel and some aluminum-zinc alloys.
- 2.—Substances possessing either one or more of the following properties: The body-centered cubic lattice, eutectoid structure, semi-plasticity, the property of elastic recovery and the property of aging.

The above list may be further simplified. For instance, elastic recovery after overstrain and semi-plasticity are accepted as being common to the body-centered cubic lattice. The peculiar phenomenon aging is a property of super-saturated solid solution. Furthermore, a eutectoid structure, as far as evidence points, is also a requirement for a yield point.

To recapitulate, it may be pointed out that the yield point is a characteristic possessed by materials having either one or both of the following properties:

(c) Moser, M., "A Study of the Yield Point," *Stahl und Eisen*, Nov. 15, 1928.

- 1.—Body-centered cubic space lattice.
- 2.—Eutectoid structure.

By deduction, it now becomes apparent that, whenever the yield point disappears in a material, either one or both of the above necessary requirements for a yield point are altered. In fact, evidence appears to substantiate this fact. It was observed that, when mild steel revealed no sharply defined yield point, the microstructure contained no cementite, or only thin broken veins of this substance.^(c) Furthermore this steel became brittle.

It is impossible with the evidence available to draw any general conclusions specifying when a material which is normally tough will become brittle, based on the above mentioned properties. The evidence available is too meager to draw any general conclusion. Specifically, however, it may be stated:

- 1.—Whenever a normally tough substance exhibiting a yield point is so treated that it disappears or that the relationship between the ultimate strength and the yield point is lowered from a certain limiting value, embrittling properties are imparted. A convenient way of illustrating this is by using the diagram already employed. (Fig. 8.)
- 2.—The tension test reveals loss of toughness in a normally tough material.
- 3.—Whenever the yield point is so altered by a treatment that it coincides with the ultimate strength, that material is considered to have its toughness reduced to a minimum.

Sheet and Tin Plate Rolls

AN investigation of the roll loads and stresses and the cause of roll breakages in sheet and tin plate mills has been made by J. Selwyn Caswell of University College, Swansea, Wales. This took the form of a paper read before the South Wales Institute of Engineers at Swansea on May 20, 1930, followed by further discussion in January, 1931. A pamphlet issued by the institute is of 122 pages, well illustrated, and giving in detail the findings of Mr. Caswell.

Stresses were investigated all the way from the foundry where the rolls are cast to the loads imposed upon them in service and the thermal stresses, resulting also from operating conditions. Experiments were conducted in several plants and a total of 182 roll breakages were investigated. These included 122 sheet mill rolls in 29 mills, and 60 tin plate mill rolls in 28 mills.

It was found that annual breakages averaged approximately 1.8 rolls for each tin plate mill and 4 rolls for each sheet mill, resulting in a total roll breakage of approximately 1600 for Great Britain, of which 1000 are in sheet mills and 600 in tin plate mills.

More rolls are broken during the winter than in the summer. More rolls are broken on Tuesday, Wednesday and Thursday than on any other days of the week, Tuesday being the worst offender. There seems to be little difference between shifts and no

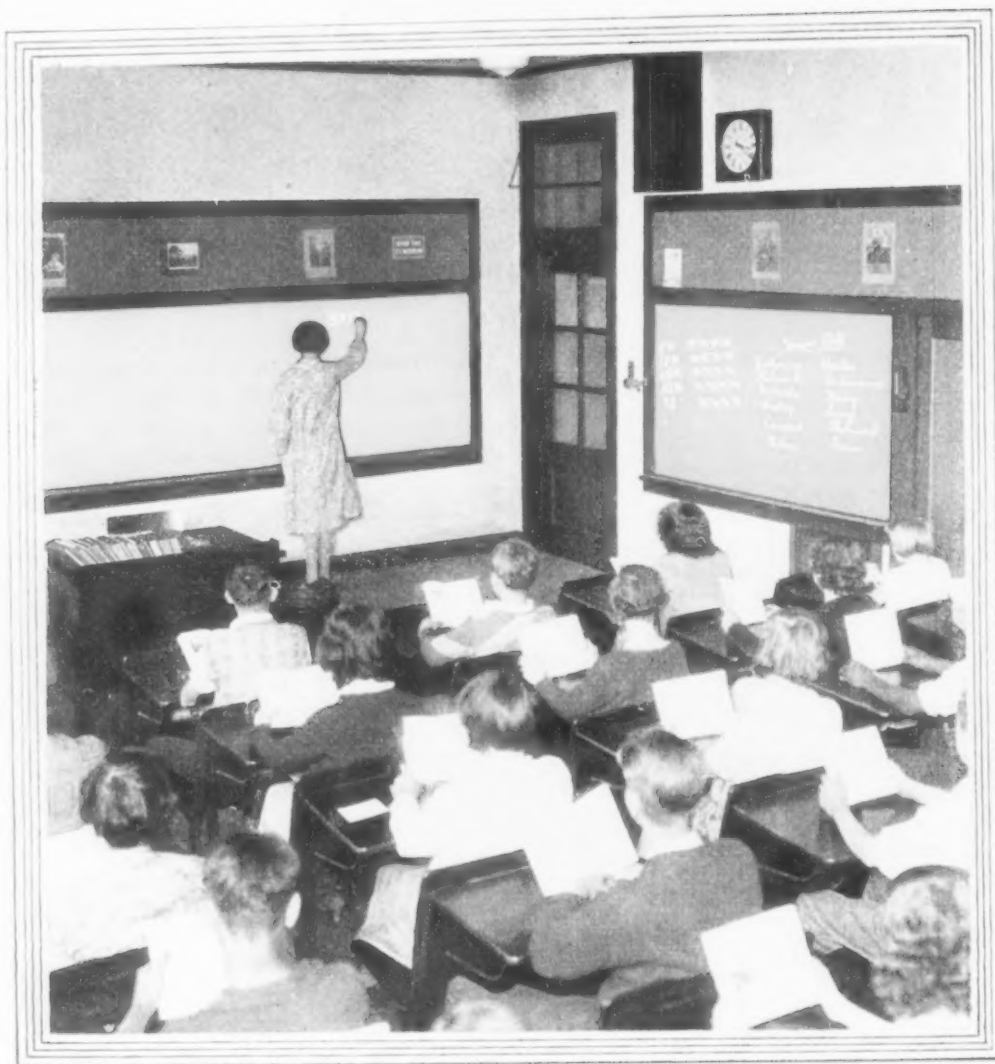
parts of shifts at which liability to roll breakage is greater than at other parts.

Roll breakages are more frequent with rolls of large diameter. The average life of a tin plate roll appears to depend more on the life of the chill than on the occurrence of breakage. Worn finishing rolls are used thereafter in roughing mills. The average life appears to be 16 weeks.

Sheet mill rolls, on the other hand, have a life which appears to depend mainly on breakages. The working life of these rolls averages eight weeks.

About 83 per cent of the rolls were broken on first run and 34 per cent were broken during the first run and matching of pieces. Nearly all of these breakages occurred on the matching of thick iron, "fours" and "sixes" in the sheet mills. It is concluded from the above that a modification or more stringent control in the practice of screwing down the rolls is desirable. This would affect the drafts taken.

There appears to be little difference between top and bottom rolls as to breakage. About 84 per cent of the rolls broken in a year in one sheet mill showed hair crack marks on the fractured faces. Some 82 per cent of the roll breakages take place through the body of the rolls. Only 14 per cent are in the roll neck, while the remaining 4 per cent are broken by spalling or torsion fractures of the necks or wobblers.



NEW USE FOR SHEETS

IN SCHOOL BLACKBOARDS

A NEW use for iron sheets is in the manufacture of colored porcelain enamel blackboards for schoolrooms. These boards will be manufactured by the American Seating Co., Chicago, and will be placed on the market within a few weeks. The idea was originated and patented by R. S. Conrow, now head of the Australian sales organization of the American Rolling Mill Co., whose Armco sheets will be used for the product. The blackboards will be made in green, gray, brown and possibly other colors.

Scheduling of Production Stabilizes Employment

FOR many years the Eastman Kodak Co. has been giving considerable attention to the problem of providing steady year-round employment to its workers, in spite of seasonal sales. The company, formed 50 years ago, now has in its organization 25,000 employees, who are engaged in 220 establishments located in 162 cities in 50 countries. Over half of the employees are in Rochester, N. Y. Kodak Park Works, the largest plant of the company, employs 8000 people.

On account of the diversity of the products the organization is a complex one, and the 8000 employees are divided into 120 departments located in 110 buildings. The products are manufactured for sale in this country and for export shipment. The problem of stabilizing the force is therefore complicated by fluctuations in the demand both in this country and throughout the world. Many of the products, however, have been standardized and changes are made gradually.

Offsetting Highly Seasonal Sales

Sales of some of the principal products are highly seasonal. Sales of roll film in November, for instance, are only 3 per cent of the total yearly sales and in July (the peak month) they are 15 per cent. The nature of the product is such that it can be kept for only a limited period and the conditions of storage must be carefully controlled.

Thirty years ago, when the company was expanding rapidly, the management realized that it would be good policy, from the point of view of both the company and the employees, to produce at as constant a rate as possible throughout the year, instead of the rate at which the goods are sold.

At that time steps were taken to accumulate stock during the slack season, although this

SCHEDULING production at a practically uniform rate throughout the year, in spite of the fact that sales in the peak month are normally five times as great as in the slackest month, is a problem which has been solved with a great deal of satisfaction by the Eastman-Kodak Co. W. G. Stuber, president of the company, told in a radio broadcast on Jan. 6 how this situation was taken care of and what results were achieved.

Even in such a poor year as 1930, only 2½ per cent of the company's workers engaged in production had to be laid off. This compares with 14 per cent in 1921, before this system was in vogue.

meant a large capital investment in refrigerator plants for the storerooms in which the sensitized goods were kept, and also an increase in the carrying charges on the inventory. The plan has been steadily improved since that time and, while at first it was planned for only a few products, it is now used for practically all of the products of the plant. This production program involves four major steps, which will be outlined briefly.

Emphasis on Adequate Sales Forecast

First, a forecast of sales is absolutely essential. This sales forecast is made by the statistical department in cooperation with the sales department. The estimates take into account the long-time trend of sales, current business conditions, and any special advertising and sales programs. The forecast covers a period of one year and every effort is exerted to make it as accurate as possible. The forecast for the year is modified from time to time, taking into account changes in conditions.

Second, the annual forecast is broken down into monthly estimates of sales. To do this we have made a study of the seasonal sales, month by month, over a period of several years, in this way arriving at a normal seasonal variation. The sales for each month are expressed as a percentage of the sales for the entire year. When these percentages are applied against the estimated sales for the year, we obtain the estimate of sales for each month.

The third step is to establish the most economical production level throughout the year. We make allowance for vacation demands during July and August and production is reduced somewhat during these two months. The plan calls, therefore, for steady production during ten months, with reduced production

(Concluded on page 755)

Budget Control Attuned to Changing Business Conditions

By SIDNEY G. KOON

Associate Editor, THE IRON AGE, New York

MUCH benefit is reported to have come from a comprehensive system of budget control which was put into effect last summer by a manufacturer of electrical goods. This followed a considerable study of the subject and a tentative set-up, and represents the latest idea of the company as to the necessary steps in controlling expenditures which are not directly productive.

All indirect labor and departmental expenses, including stores, equipment repairs, etc., are allocated on a definite basis on the direct-labor hours as ascertained monthly. And it has all been worked out to fit conditions of expanding or declining business activity.

Cost accounting in this plant is divided among the 35 departments, of which about 20 are directly productive. All costs which can be allocated directly to each department are so handled. General office and other non-productive expenditures, after being allocated to their respective accounts, are then split up among the productive departments in a manner which will be briefly described below.

Based on Three Years' Business

In establishing the general budget relationship of various expenditures to various departments a study of three consecutive years was made, in which all the

amounts were tabulated. This period was considered sufficiently typical to establish a "normal."

Each line in the tabulation (Table I is a sample, with fictitious figures) represents the direct allocation to a department. Each column in the tabulation represents a general classification of expense, whether indirect labor, stores, equipment repairs, or what not. The summation of the figures in each line for a productive department made the first approach to that department's budget allotment. It remained then to distribute among the productive departments the costs chargeable against the non-productive departments, in such a way as to make a fair working basis. This was done by special analysis of each account and how it impinges upon the productive capacity of the plant.

Anything chargeable to rentals or insurance does not vary with the operating percentage of the plant as a whole, or of any department. Some other items, such as heating, lighting, etc., are on this same uniform basis, but with a seasonal variation.

On the other hand, a number of expense items, such as cleaning costs, handling of materials from department to department and several other things are in a definite relationship to production, although not necessarily in direct ratio to the rate of operation. All of these were allocated as nearly as could be to

TABLE I—BUDGET BASIS IN DOLLARS, NORMAL MONTHLY

DEPARTMENT PRODUCTIVE	INDIRECT LABOR	STORES	EQUIPMENT REPAIRS	OTHER EXPENSE	TOTAL EXPENSE
No. 1	\$234	\$37	\$45	\$23	\$339
2	312	90	27	30	459
3	187	19	63	12	281
4	239	44	etc.		
5	412				
6	etc.				
7					
etc.					
NON-PRODUCTIVE					
A	\$507	\$64	\$ 8	\$47	\$626
B	273	78	21	18	390
C	326	etc.			
D	189				
E	etc.				
F					
etc.					

WHEN budget control can take care of varying rates of operation, and thus span the exigencies of business crises, it is in the way of becoming as nearly an exact science as such a matter can become. How one manufacturer has developed his system to meet these conditions is told in this article. Each department is placed on such a basis that non-productive and other expenses are allocated in a definite relation to rate of operation. Even the non-productive departments are subjected to the same treatment, and the results are working out exceptionally well.

the productive departments, it being assumed that the average of the three years taken for the initial study (with certain adjustments to allow for abnormal variations) represented standard conditions.

Making It Fit a Changing Business Tempo

Having obtained the basis for a normal budget, this figure was then stepped up or down for varying operating conditions above or below the normal on which the study was made. The whole thing is based on monthly production, assuming that from 95 to 100 per cent of the base hours represents normal. Below 95 per cent are the groups 90 to 95, 85 to 90, 75 to 85, 50 to 75 and below 50 per cent. Above the normal are the groups 100 to 105, 105 to 110, 110 to 115, 115 to 125, 125 to 150, and above 150 per cent.

For each of these groups of operating rates a definite budget figure has been worked out for each department, and for each of the main items of expenditure subjected to budget. This is shown—again using fictitious figures—in Table II.

On obtaining the cost figures for a month just elapsed, together with the operating rate expressed in productive hours, it is easy to figure the percentage of operation from the standard already established. That percentage will fall within one of the groups mentioned above and hence, from the master sheet, the budget allowance under the several headings can

be picked off directly for each operating department, including both productive and non-productive units.

How the Figures Are Applied

For example, if 5000 hr. be the normal for a given production department, and 4139 hr. be the total actual productive hours for that department in a given month, operation for that department is at 83 per cent of normal. This falls within the 75 to 85 per cent classification, and the budget for the department is taken from that group, in examining the closeness with which actual expenditures held to budget allotments. A similar procedure is followed in the case of other productive departments, the per cent of normal being arrived at, in each case, by taking the ratio of the actual production hours to the normal hours.

In the case of non-productive departments, the per cent of normal used to arrive at the budget allowances in a given month is obtained by taking the ratio of total production hours of all productive departments, combined, to the total normal production hours. Thus, if 49,600 hr. be the normal, and 42,739 be the reported total, their ratio of 86 per cent is applied. This falls within the group labeled 85 to 90 per cent.

Department statements are made up, showing the budget allotment of expenses under these several

TABLE II—BUDGET MONTHLY TOTALS FOR VARYING OPERATING RATES
DEPARTMENT No. 2

OPERATING RATE	50 to 75	75 to 85	85 to 90	90 to 95	95 to 100 (a)	100 to 105	105 to 110	110 to 115, etc.
INDIRECT LABOR	\$232	\$277	\$292	\$302	\$312	\$322	\$332	\$342
STORES	58	76	82	86	90	94	98	102
EQUIPMENT REPAIRS	17	23	25	26	27	28	29	30
OTHER EXPENSE	20	26	28	29	30	31	32	33
TOTAL BUDGET	\$327	\$402	\$427	\$443	\$459	\$475	\$491	\$507

(a) CONSIDERED "NORMAL"

headings, side by side with the actual expenditures. This permits quick determination of excess costs or savings in costs. Such a statement is sent to the head of each department. Meantime, copies of these same reports, together with a summary report, go to the general manager for his information.

Notes appear on these reports explanatory of excess costs, where such an explanation is readily at hand. In many cases this makes it unnecessary to delve further into the matter in determining responsibility for cases where the budget has been exceeded. Where such an explanation is not readily obtainable, however, or where it is not a satisfactory excuse for having exceeded the budget, investigation is at once instituted and responsibility placed.

It happens that this company has a large engineering and development expense in connection with much of its work. Development work takes mostly the form of special electrical devices, largely made to order. This makes budgeting of such a department a very difficult procedure. It is being done, however, although, of course, not with the precision which applies to some of the other departments.

Repairs of departmental equipment are made the subject of a special report. The foreman of the repair department is the responsible man in connection with such costs as these, and he receives each month a report corresponding with that sent to each department head throughout the plant.

Keeps the Men Alert to Stop Leaks

Much of the benefit accruing from this budget system of handling expenditures arises from the psychological factor. Each foreman is on his toes to see that his department is not made the subject of

adverse criticism because of exceeding budget allowances. There is at the same time a certain spirit of rivalry engendered, and efforts are made to get short cuts in every way available. These reports customarily reach the department heads about the middle of the month succeeding that for which the report was made. It is the desire, of course, to speed up this statement, inasmuch as any delay will cause the department heads to regard the matter as so much "ancient history."

Another advantage of this budgeting method, however, lies in the fact that it affords a check not only directly upon costs as they accrue, but also upon the question of whether costs have been charged to the proper accounts. Thus, if anything is charged to overhead which should have gone into productive or direct labor costs, the system permits this fact to be established and thus makes for a better cost accounting result than if there were no such check.

As an instance of how closely this budgeting system is working it may be mentioned that, over a period of several months, when the items subjected to budget amounted to something more than \$175,000, the total came within \$439 of the amount allotted to the several accounts of the different departments.

This does not mean that all departments were as close to their budgets as this total figure indicates. Some departments made a distinct saving, compared with the budgetary allowance, while in other cases there was quite a large overage. Taking the entire plant as a whole, however, the actual expenditures on the budgetary items were within approximately 0.25 per cent of the total amount allotted. And this was done during a period when business has been none too good, and, correspondingly, many overhead items have tended to be high.

Strength of Rectangular Flat Plates Under Edge Compression

FLAT rectangular plates of duralumin, stainless steel, Monel metal and nickel have been tested under loads applied at two opposite edges and acting in the plane of the plate. The edges parallel to the direction of loading were supported in V-grooves. The plates were all 24 in. long and varied in width from 4 to 24 in. by steps of 4 in., and in thickness from 0.015 to 0.095 in. by steps of approximately 0.015 in. There were also a few 1, 2, 3 and 6-in. wide specimens.

Details of these tests are covered in Report No. 356 of the National Advisory Committee for Aeronautics, prepared by Louis Schuman and Goldie Back. The loads were applied in the testing machine at the center of a bar which rested along the top of the plate. Load was applied until the plate failed to take any more load.

The tests show that the loads carried by the plates generally reached a maximum for the 8 or 12-in. width, and that there was relatively small drop in load for the greater widths. This is explained by the fact that, when the plate buckles, since the greatest deflection occurs at the center, its vertical chords will shorten

more there than at the ends. In consequence there will be less load on the plate at the center and more toward the ends, where it is better supported to resist bending and can continue to take load after buckling has occurred. In this way, the load carried by plates of a given thickness would tend to be constant for all plates wider than that at which the maximum load is reached.

Deflection and set measurements perpendicular to the plane of the plate were taken and the form of the buckle was determined. The number of buckles was found to correspond in general with that predicted by the theory of buckling of a plate uniformly loaded at two opposite edges and simply supported at the edges.

The tests were made by the Bureau of Standards, in cooperation with the Bureau of Aeronautics of the Navy Department. The materials chosen were those suitable for aircraft construction. The data obtained will be of use in the design of floats, pontoons, wings, etc., when the plating is subjected to pressure against the edges. It is desired to make this as light as possible, yet strong enough to take the required loads without permanent deformation.



STEADY work agrees with "Sammy" Johnson. He has been a member of the Midvale working family for 47 years, and carries his 77 years lightly. You see him here operating a straightening machine, which requires energy, agility and good judgment.

When Frederick W. Taylor, father of scientific management, first started his experiments on high-speed steel, "Sammy" assisted him as inspector.

When a man puts his heart into his work, it responds by keeping him young.

Metallurgy of the

THE die set of today consists of the following mechanically as well as metallurgically differentiable parts (See Fig. 1):

- 1—Die shoe
- 2—Punch holder with shank
- 3—Leader pins
- 4—Bushings
- 5—Lubricating device

The selection of particular metals for these parts depends primarily upon several expectations. The most outstanding requirements of a modern die set as a whole being accuracy, price and long service, the material specifications will have to conform to certain chemical as well as physical characteristics of the utilized metals. While die shoes and punch holders are ordinarily made from a special grade of cast iron or cast steel, leader pins and bushings are machined from rolled steel and then heat treated to produce a hard and uniform wearing surface after subsequent grinding. The various lubricating devices should provide dependable lubrication requiring the least possible attention during the service of the die set. Since, however, oiling features of die sets are somewhat outside the scope of the pres-

ent article, no particular attention will be paid to this part of the modern die set.

Semi-Steel for Die Set Castings

In modern foundry practice, castings to be used in the manufacture of die sets are almost exclusively made of so-called semi-steel. Semi-steel is, however, a special grade of gray cast iron and, although this material as a casting by no means resembles steel, its production requires additions of 15 to 45 per cent, and even more, of steel.

Since the desired chemical composition of the castings depends upon the charge as well as the metallurgical process to be utilized for the melting of the metal, care should be exercised in the selection of the most appropriate melting furnace. While most die set castings are produced from cupola iron, attempts to make the metal in the air furnace or to finish a cupola melt in an electric arc furnace have given highly satisfactory results and have yielded substantial savings through a decrease of the necessary cross-sections without impairing the rigidity of the castings. The improved physical properties, especially transverse strength, warrant this decrease in cross-sections. Consequently lighter castings are the result of this tendency.

Cast Steel for Die Set Castings

However, since this phase of making die set castings is still in its infancy, attention should be directed to the metals used successfully, not only by manufacturers of die sets, but also by companies having their own die set departments.

The chemistry of die set castings may best be illustrated by the following analyses:

	Per Cent	Per Cent	Per Cent	Per Cent
Total carbon.....	3.10	3.24	3.19	3.13
Graphitic carbon.....	2.49	2.60	2.35	2.54
Combined carbon.....	0.61	0.64	0.84	0.59
Silicon.....	1.90	1.84	1.49	2.11
Manganese.....	0.76	0.87	0.91	1.06
Phosphorus.....	0.244	0.282	0.154	0.312
Sulphur.....	0.093	0.110	0.076	0.069
Copper.....	.....	.....	0.16	.....
Nickel.....	.....	0.14	.....	0.51
Chrome.....	.....	.....	.....	.....

From these and other analyses of die shoes and punch holders the specifications for this type of castings may be summarized as follows:

	Per Cent
Graphitic carbon.....	2.50 to 2.75
Combined carbon.....	0.50 to 0.75
Silicon.....	1.50 to 2.00
Manganese.....	0.60 to 0.90
Phosphorus.....	0.150 to 0.350
Sulphur, max.....	0.100

Wherever maximum strength of a die set casting is required, either plain carbon or alloy steel cast-

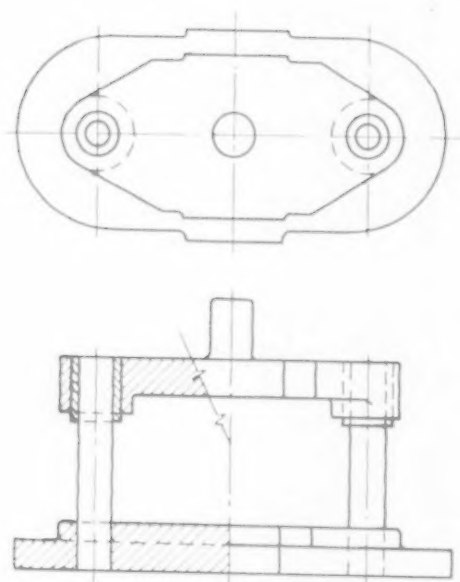


Fig. 1.—Sketch showing various parts of a modern die set. It does not show the oiling device.

Modern Die Set

By JOHN H. HRUSKA

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CASTINGS for die sets are made almost exclusively from semi-steel or high-test gray iron. Wherever maximum strength is necessary, plain carbon or alloy steel castings are used. For leader pins and bushings, modern practice is to use pearlitic manganese steels. The author discusses the composition and heat treatment of such materials, based on an investigation of some of the best modern sets.



Fig. 2.—Stationary furnaces used in the carburization and heat treatment of leader pins and bushings.

ings are utilized. Because of the unprecedented development of the alloy steel industry in recent years, probably the most discriminating specifications of the stamping or pressing trades are met by the alloy steel casting, especially if made from electric furnace metals.

At present modern methods of scientific approach to the important problem of making strong and reliable castings call for very close ranges of chemical composition and thermal treatment, as well as resulting physical properties.

The die set of today demands a thorough knowledge of the various effects of chemical elements upon the behavior of the finished product under the most strenuous service conditions. Therefore, the chemistry of the die set casting, made of good steel in well-managed steel foundries, will actually fulfill the highest expectations of the trade as to accuracy and long life. Some of the best castings were analyzed and the results of the examination are compiled below:

	Per Cent	Per Cent	Per Cent
Total carbon.....	0.33	0.35	0.29
Manganese	0.81	0.69	0.74
Phosphorus	0.021	0.018	0.034
Sulphur	0.017	0.012	0.025
Silicon	0.23	0.24	0.46
Nickel	0.14	.....	1.56
Chrome	0.06	.....	0.16
Vanadium .....	.....	0.24	.....

The castings corresponding to the first two analy-

ses given above were made from basic electric furnace metal, whereas the last one originated from a basic open-hearth furnace. In all instances the castings were thoroughly annealed before being put into service.

The great variations of chemical composition of die set castings made from steel make it difficult to establish generally applicable specifications, since care in manufacturing such castings is also of vital importance.

Heat Treatment of Die Set Castings

While most manufacturers of die set castings do not submit their castings to any subsequent treatment, uniformity of structure and absence of any stresses in certain cases are assured by a careful annealing after casting. However, judgment should be exercised in the selection of the most suitable temperature, together with the most economical duration of the annealing cycle as a whole. Several factors are, for these reasons, to be taken into account.

Increased temperature decreases the hardness of the metal, prolonged heating enlarges the graphite flakes of the matrix and decreases the transverse

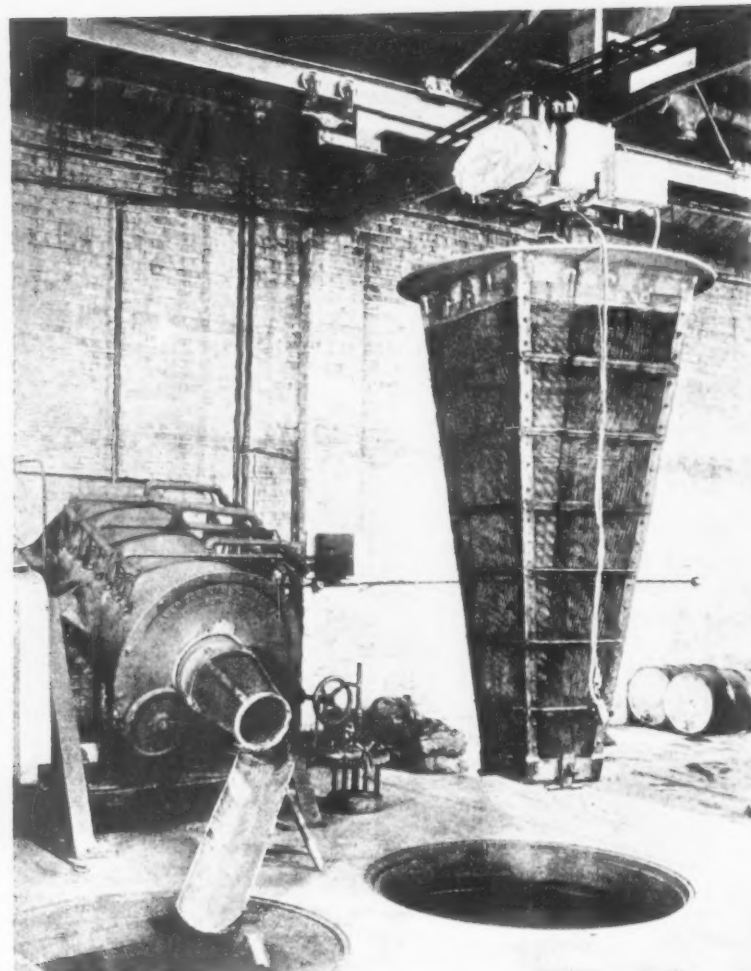


Fig. 3.—Rotary gas-fired furnace used in the thermal treatments of leader pins and bushings. (Courtesy American Gas Furnace Co., Elizabeth, N. J.)

are being made of the modern pearlitic manganese steels. While it is true that quite satisfactory results may be obtained by the utilization of the regular S.A.E. 1020 or 1120 steels of carburizing grade or by using high-carbon steels, the desirability of a strong and ductile core together with a file-hard and uniform wearing surface are the present standards for the best leader pin and corresponding bushing.

With the introduction of pearlitic manganese steels, i.e., low carbon steels containing from 0.90 to 1.90 per cent manganese, the following considerable

strength. During the author's experiments with castings of this type containing

	Per Cent
Graphitic carbon	2.48
Combined carbon	0.54
Manganese	0.78
Phosphorus	0.264
Sulphur	0.093
Silicon	2.01
Nickel	0.22
Chrome	0.07

the following determinations of Brinell hardness numerals were made after a heating of 3 hr. at the indicated temperatures:

Annealing Temperature, Deg. F.	Brinell Hardness 3000 Kg. 30 Sec.
As received	215
1450	176
1500	161
1550	148
1575	135

The cooling of all castings under investigation was carried out in the furnace, the experiments being made by using commercial gas-fired heat-treating furnaces. All sections measured 2 in.

Leader Pins and Bushings

Considerable thought, discussion and experimentation have been given in recent years to the development of the most suitable, economical and reliable material for the manufacture of leader pins and bushings. In summarizing the results of all these efforts one may say that today most of these parts

advantages have been derived:

1. Decrease of carburizing time—up to 35 per cent.
2. Lower carburizing temperatures.
3. Better uniformity of resulting physical properties after heat treatment.
4. Less deformation and consequently less straightening after heat treating.
5. Increase in the speed of mechanical operations amounting to 20 to 90 per cent.
6. Better life of tools—35 to 400 per cent.

Carburized leader pins and bushings may naturally be ground to within about 0.030 in. of the case and still maintain the desirable hard surface. Hence, the specifications of surface hardness for good leader pins after grinding call for C-60 to C-64 Rockwell numerals, with C-58 to C-63 Rockwell numerals for the bushings. In order to obtain such characteristics of the case, together with good core properties, the following treatment is recommended:

- 1—Carburize at 1625 deg. to 1650 deg. to produce sufficient depth of case.
- 2—Quench in water.
- 3—Reheat to 1425 deg. to 1475 deg.
- 4—Quench in water.
- 5—Draw leader pins to 325 deg. Fahr., bushings to 375 deg. to 400 deg. Fahr.

Quite naturally the quality of the resulting product depends also upon the kind of furnace and the general care given to each treatment. As the result

of many tests and comparative investigations, it seems that box carburizing is especially desirable in case of long leader pins and larger bushings, while the rotary furnace has certain outstanding features so far as quicker production and lower production costs are concerned.

In well-managed steel-treating departments, uniformity of depth of case, hardness and physical properties may be equally obtained by box carburizing or rotary furnaces. Where, however, the unavoidable deformation of heat-treated parts is of importance, due consideration without prejudice should be given to both methods. Quenching should be carried out in accordance with the well-known principles of steel treating, namely, leader pins should be quenched in a perfectly straight position in order to eliminate excessive warpage; bushings are best quenched individually so as to warrant uniformity of the interior wearing surface.

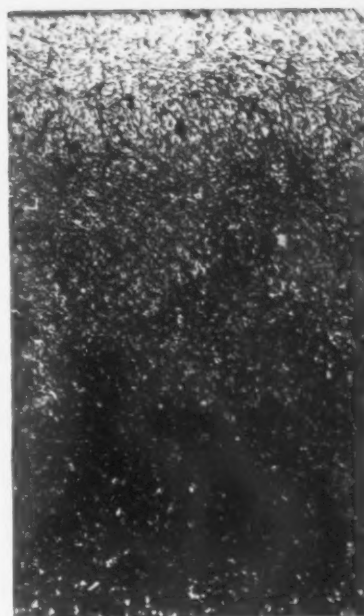
Many of the so-called mechanical furnaces do not give a sufficient uniformity of cooling, due to the formation of the so-called "steam pockets." Furthermore, the deformation of the bushings is much more pronounced in the "at random" quench than in a careful individual quenching operation.

Drawing of the carburized and quenched stock may be carried out either in air, salt or oil. The draw at temperatures indicated above should be continued at least for 1 hr. Successful drawing may be



Fig. 4.—Microstructure of carburized leader pin just before quenching; specimen cooled in air. The three sections of the carburized surface layer are clearly discernible: Case (top), transition or gradation zone (middle) and core (bottom). Taken at 100 dia., etched with 2 per cent HNO_3 .

Fig. 5.—Microstructure of bushing after carburization, quenching and drawing, taken at 100 dia., etched with 2 per cent HNO_3 . Compare with Fig. 4.



done in rotary furnaces, salt pots or oil tanks with accurate temperature regulation. Wherever possible automatic control apparatus should be utilized

Gas Content of Some Vacuum-Melted Metals

THE hydrogen and carbon monoxide contents of certain vacuum-fused metals have been reported by A. Villachon and G. Chaudron, *Revue de Metallurgie* (July, 1930). The metals were fused in nichrome or carbon spiral resistance furnaces with magnesia crucibles under vacua ranging from 0.002 mm. at 1800 deg. Fahr. to 0.02 mm. at 3100 deg. The ingots obtained were reduced to sheets about 0.004 in. thick, which were heated for prolonged periods under vacuum to determine the quantity of gas released at various temperatures. The results are summarized in the table.

Hydrogen and Carbon Monoxide Found in 10-Gram Samples of Vacuum Fused Metals

	Conditions of Vacuum Fusion			Temperature of Degassing the Resulting Sheet, Deg. Fahr.	Volumes of Gas Recovered, cc.	
	Time Hr.	Temp. Fahr.	Pressure mm.		H_2	CO
Electrolytic nickel	1	2,820	0.02	1,470	0.4	0.7
Electrolytic nickel	1	2,910	0.02	1,470	0.6	0.8
Electrolytic nickel	1	3,360	0.02	1,470	1.8	0.8
(Vol. $\text{CO} + \text{H}_2$)						
Electrolytic copper	1	2,550	0.02	1,110	0.25	0.4
Electrolytic iron	1	2,910	0.02	1,110	1.15	1.0
Nitrided Armco iron	1	2,910	0.02	1,110	0.7	0.6
Aluminum	5	1,470	0.002	1,110	1.5	0.6

The quantities of hydrogen recovered by degassing in the solid state are of the same order of magnitude as the solubilities determined near the melting point under one atmosphere pressure, as measured by Sieverts and by Iwase, but they do not represent the entire amount in the metal. The tests on nickel show the failure to reduce the gas content by raising the temperature of the melt. The only way to diminish the CO and H_2 contents is by prolonged heating of finely cut sheet near the melting point. The above metals in the liquid state hold the gases as carbonyls and hydrides of low dissociation pressures.

Development of

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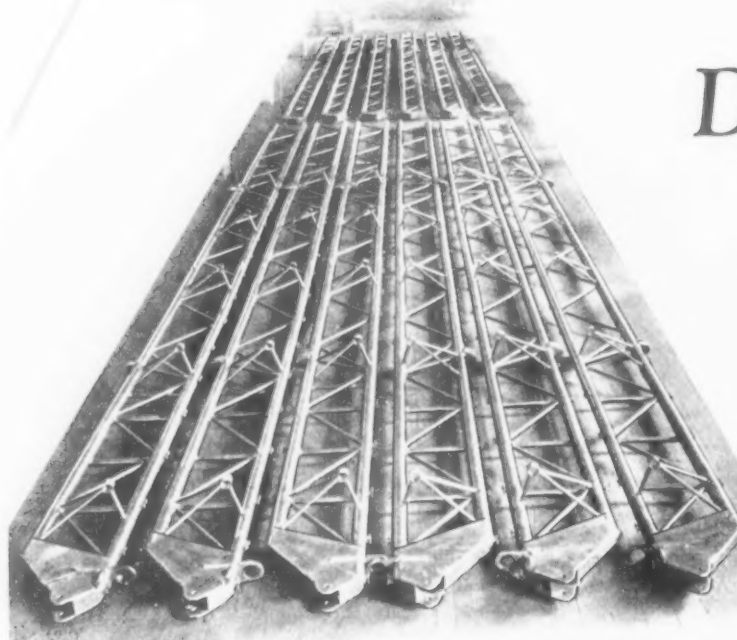


Fig. 2—Three sets of steel beams, 24 ft. long, for Stinson 10-passenger transport plane. Tensile strength over 180,000 lb. per sq. in.

ONE of the outstanding developments in aircraft construction during 1930 was the definite and permanent introduction of welded and heat-treated alloy steel wing beams. This is believed to be nearly as significant and far-reaching a development as the adoption of the welded steel fuselage six or eight years ago.

Some welded but untreated steel beams were built by Keystone Aircraft Corp., Bristol, Pa., as early as 1927, but were not continued in production, apparently because they were not sufficiently light. Some early success was achieved in the use of steel tubing, previously heat treated or cold drawn to high strength and assembled by bolting or riveting. In England alloy steel, heat treated in strip form or rolled sections and joined by riveting, has been used for some time. In the Curtiss Condor, further discussed below, previously heat-treated tubes were assembled by welding in 1929. The first steel wing beam, assembled by welding and afterward successfully heat treated to high strength, was made for the Curtiss Kingbird about December, 1928. The welded and heat-treated steel spar has proved so satisfactory that it has been adopted in commercial production by two large manufacturers, and introduced into one or more ships by half a dozen others.

Steel has long been regarded as the right construction material for buildings, bridges, railroad cars, ships and automobiles, and there is confidence, on the part of the public as well as aircraft engineers, in "wing spars of alloy steel tubing, heat treated to high tensile strength, rigid in design and efficient in use."

Realization of the limitations of other structural materials has for a number of years inclined aircraft engineers toward the use of steel. But without heat treatment, steel beams could not be made strong enough to be light. It was formerly impossible to

heat treat a delicate structure such as a wing beam without ruinous distortion. Actual construction was made possible through the use of new vertical electric heat-treating furnaces designed especially for the purpose. (Heat Treating Aircraft Parts, THE IRON AGE, Aug. 29, 1929.)

Wooden beams are still the most easily built in small lots, particularly where major changes are expected to be necessary, but the increasing difficulties of obtaining sound wood in quantities, of transmitting heavy loads through bolted joints in tension, of combining satisfactorily with ribs which are now most advantageously made of metal—all these restrict the use of wood in new designs. The hazard of splintering wood in a crash has long made metal construction favored and the superior energy absorbing ability of metal has further reduced the serious consequences of the wrong kind of a landing. Wood construction can deteriorate and become unreliable in a relatively short time.

Moisture brings a series of difficulties peculiar to wood and wood construction that have brought drastic prohibition against its use in some types of ships. Not only is the wood itself subject to rotting, but the glued joints may be attacked by fungus and any metal parts in contact may be speedily disintegrated by moisture held by the wood. Warping is also encountered both during fabrication and after installation, and shrinkage is frequently the cause of failure to maintain accurate dimensions on mating parts.

Duralumin beams have been intensively investigated and successfully used in a number of instances. They are often efficient metal structures. They have the general advantages common to metal types in points of construction, maintenance and repair, and operating safety. Their chief drawbacks are (1) cost of construction, (2) the excess weight of metal

Steel Wing Beams for Aircraft

H EAT-TREATED alloy steel wing beams are winning as wide adoption in the aircraft industry as the welded steel fuselage. Steels for wing beams are available with tensile strengths of 250,000 to 300,000 lb. per sq. in. after heat treatment, according to the authors. They list the advantages of steels of this type over other materials, describe heat-treating equipment employed and outline the construction of wing beams developed by various airplane builders.

required in overlapping members of riveted or bolted joints, (3) the fabrication difficulties caused by the use of quantities of duralumin rivets which require special apparatus and technique for heat treatment and installation, (4) the loosening of rivets in service, and (5) the corrosion so frequently found to be severe, even with special methods of protection. The chief advantage of duralumin beams is found in small ships where the sections are light.

Steel beams, had they benefited by the same attention given to the development of duralumin beams, would be even further advanced in engineering and construction features, but their present excellence in the second year of their development is notable. Most designs combine the inherent advantages of welded joints with those of heat-treated steels of high strength. Welded joints can be made not only of excellent strength and reliability, but also of superior rigidity at a minimum of weight. The latter is true because welding permits of integral construction

without overlapping and duplicating material in the joints. The joint is thus lighter and more rigid than a riveted or bolted joint and also occupies less space, a fact of considerable importance in many cases where connections are complex.

The advantageous features of welded construction have been developed to a high degree in the construction of the tubular steel fuselage, which is now used in more than 90 per cent of all aircraft. The same steel, chrome-molybdenum (S.A.E. 4130-X), which is used so universally in fuselage construction, is employed in steel wing beams. It has not only excellent fabricating and welding characteristics, but can be heat treated to a tensile strength as high as 200,000 lb. per sq. in., with a very good elongation or toughness. For beams of thin section, a tensile strength of 140,000 and 150,000 lb. per sq. in. has ordinarily been used, while for heavier sections the strength may be increased to 175,000 or in some cases even to 200,000 lb. This tubing is employed regularly for the

Stinson tri-motored 10-passenger transport plane used on New York-Philadelphia-Washington Airways. Wing beams are of alloy steel tubing, heat treated after fabrication.



manufacture of landing gear at strengths of 150,000 to 200,000 lb. per sq. in.

When steel is heat treated to over 150,000 lb., its strength-weight ratio is higher than that of duralumin, and it is therefore lighter as a material of construction. The ratio of yield point to ultimate strength is also higher. The greater lightness of welded joints in steel, as compared with riveted joints in duralumin, is of further benefit in increasing this ratio for the whole design assembly. Steel beams are thus seen to have the important advantages of a standard material available in bar, sheet and tube forms which can easily be fabricated in the annealed state and given high strength values by final heat

importance. Metallurgical Laboratories, Inc. (known as "Metlab"), operates one furnace with a heating space 25 ft. high by 2 ft. in diameter in inside measurements and another 10 ft. high by 33 in. square. These are electrically heated and controlled, being provided with pyrometers which control and measure the temperatures in as many as six zones. Directly under the furnaces are oil quenching tanks (which may be used). The furnace charge, suspended from "spiders" of heat-resisting alloy, can be very rapidly lowered into the tanks. These furnaces give complete control of the time element in heating and quenching, as well as very accurate regulation of the working temperatures. The quick transfer from furnace

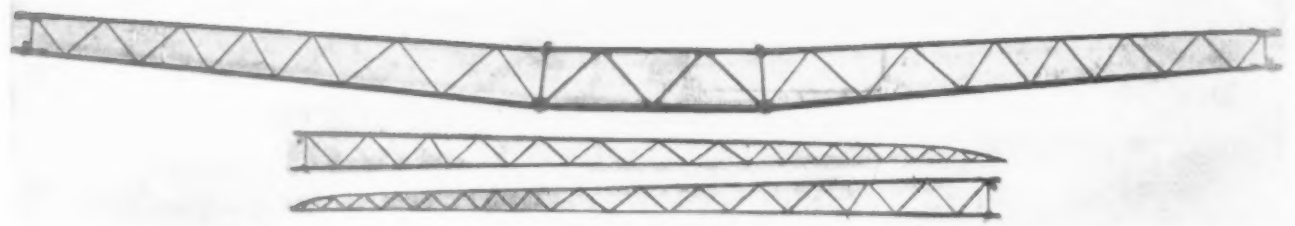


Fig. 1.—Beam for Curtiss Teal, a tapered wing monoplane (above).

Fig. 3.—Fairchild steel beam for Army plane. Webs are elliptical tubing, truss members round (below).



treatment, together with a convenient method of joining which is at once light, rigid, economical and reliable. With a welded steel wing beam it is possible to build up quite a varied structure almost at will, to add brackets, and fittings, supports and bearings, tension lugs and strut attachments, rib clips and reinforcements at any time before heat treatment. Indeed, the more complicated the joint, the more the engineer appreciates this convenience and flexibility, particularly when some new member has to be added to an otherwise completed design.

To heat treat such long members without distortion was for a number of years an unsolved problem, which prevented the use of alloy steels of high strength. Large horizontal furnaces were out of the question, gun-treating pits were inadequate in their arrangement and handling facilities, and the Sneed electric direct-heating machine was limited to simple straight members of constant cross-section, free from joints, fittings or attachments. As a result of thorough engineering study of the problem, vertical electric furnaces or heat-treating machines were designed which were adapted to handle the long delicate beams in a thoroughly satisfactory way, thus making possible the production of members which were so favorable in design.

There are in daily operation in Philadelphia two vertical furnaces of this character which are successfully treating not only aircraft wing beams but a great variety of other aircraft parts and general commercial parts in which straightness is of the utmost

nance to quenching medium accounts in a measure for the uniformly excellent physical properties obtained and could hardly be equaled by any type of furnace operating horizontally.

Distortion during heat treatment can be prevented and initial curvature can sometimes be removed, since gravity acts for rather than against longitudinal straightness. Heat treatment of the assembled beams not only gives the parent metal high strength and toughness, but also refines and strengthens the welds and removes internal stresses due to working and welding. (Such a treatment should properly be given every welded steel joint, but frequently is omitted. It is fortunate in steel wing beams that heat treatment is so necessary to strength that it can also be available for conditioning the joints and so effectively increase the reliability of the structure.)

Many airplane manufacturers in this country are actively progressing with the experimental design and construction of steel wing beams or with their actual production. There is a general impetus to substitute metal beams for wood and the choice apparently lies principally between riveted duralumin or welded steel. The list of those companies which are at present making steel beams is particularly notable, in view of the fact that facilities for heat treating them have been available for less than two years. Other companies are designing new wings or new ships with heat-treated steel beams and the general interest in the subject is such as to insure further adoption of this type of construction. It is not possible, obviously, to

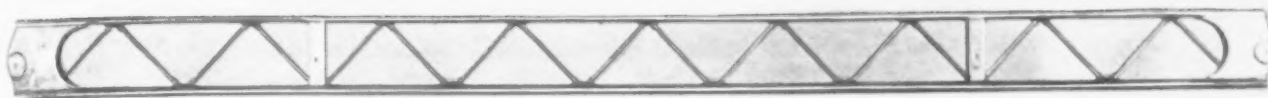
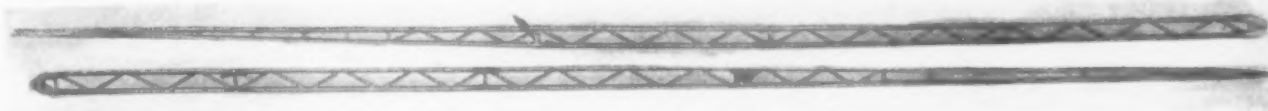


Fig. 4.—Center section for Chance-Vought plane, heat-treated to 150,000 lb. per sq. in. minimum (above).



Fig. 5.—Steel spars for the highly efficient Bellanca Airbus (below).



give information about many of these developments, but some of the aircraft companies have allowed release of photographs and general descriptions of their steel beams. Curtiss Airplane & Motor Co., Garden City, N. Y.; Stinson Aircraft Corp., Wayne, Mich.; Fairchild Airplane Mfg. Corp., Farmingdale, N. Y.; Bellanca Aircraft Corp., New Castle, Del.; Cunningham-Hall Aircraft Corp., Rochester, N. Y.; Fleetwings, Inc., Garden City, N. Y., and Chance Vought, Hartford, Conn., are pioneers in this work.

Fleetwings has developed a box-type spar of sheet metal which features electric spot-welded joints in close proximity. This method is an interesting use of spot welding and has possibilities for production which merit investigation.

Cunningham-Hall employed tubular members, heat-treated as tubing and joined into assemblies by drilling after heat treatment and then bolting. This construction uses pre-heat-treated steel tubing in exactly the same manner as duralumin tubes are so frequently used in riveted and bolted fuselage designs. The remarkable machinability of chrome-molybdenum steel in the heat-treated state permits drilling, reaming, spot facing, turning and other operations necessary for working and joining.

Curtiss developed heat-treated steel beams for the Condor, the Kingbird and the Teal. The Condor designs featured the use of pre-heat-treated elliptical tube flanges with normalized tube truss members and pre-treated fitting clusters, all welded in place in steel lugs. This heat-treated tubing was the first to be used in this way, Summerill Tubing Co., Bridgeport,

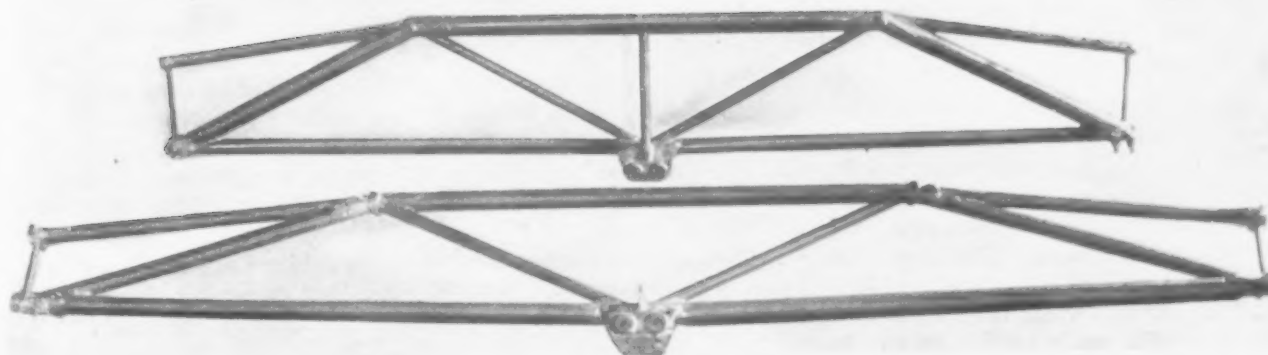
Pa., furnishing the drawn tubing to Metlab, where it was heat treated in the original long lengths and shipped to Curtiss for working. In this condition it could readily be machined, cut, filed, drilled, reamed, and otherwise worked or welded. This tubing, without further heat treatment, is now flying about the country in the high performance Curtiss Condor transport planes, carrying 20 passengers, and in the corresponding military bombing planes furnished the United States Army.

When previously heat-treated members are welded, the benefits of heat treatment are, of course, eliminated in the region of the weld. This leaves the joints with a tensile strength of somewhat above 80,000 lb. per sq. in., as in the ordinary fuselage made of normalized chrome-molybdenum steel tubing. In the Condor beams the design was such that, due to column action, stresses were high only midway between the joints or panel points, and low at the joints themselves. The welds were therefore not points of weakness and the strength was consistent for the beam as a whole and the factor of safety was relatively uniform. The tension members of the truss were carried through both walls of the tubular flanges for added strength and safety. This arrangement considerably complicates fabricating difficulties. It has not been used by later designers.

Next, from the Curtiss engineers, came the Kingbird for which Metlab has just completed the fabrication and heat treatment of a production order of 15 sets of steel beams. (See THE IRON AGE, Aug. 21, 1930.) It differs from the Condor in that the flanges,



Fig. 6.—General airplane center sections, 75 lb. lighter than wooden construction.



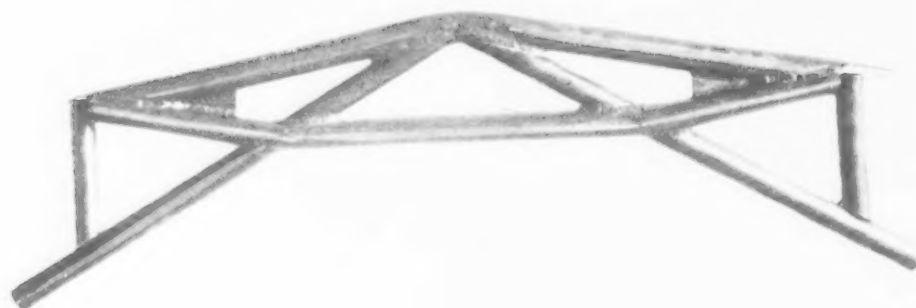


Fig. 7.—Center sections for Berliner-Joyce fuselage, welded into place after heat treatment.

truss tubes, rib clips, etc., are completely welded in half-length sections before heat treatment. These sections are later joined together by welding. This is possible because the bending moment is a minimum near the mid-position of the wing. The short tips are attached by welding after heat treatment. In the Condor and Kingbird, the flange tubes are made elliptical to increase the moment of inertia of the whole beam in both directions. The flanges are made of various sizes, telescoped so as to conform in strength to the varying calculated loads along the length of the beam. Discretion must be exercised in making such refinements or more weight will be added in weld metal and overlapping sleeves than is saved by changing tube sizes. Such irregularities of construction are costly in labor. They also tend to promote distortion because of the added welding. Clips of low-carbon steel are ordinarily welded to the beam for the attachment of ribs.

In general, low-carbon steel welding wire has been employed. No allowance has been made for any increase in the strength of these joints by heat treatment. Tests made on single butt joints have shown a remarkable increase due to the heat treatment. Such joints, unheat-treated, ordinarily fail adjacent to the weld at a stress slightly higher than 80,000 lb. per sq. in. Specimens have been tested, however, which when heat treated to develop a strength of 175,000 lb. per sq. in. in the tube, have failed through the weld at loads corresponding to 140,000 lb. in the tube. This indicates that even a low-carbon steel welded joint can be greatly improved by heat treatment. It is not recommended that welds be designed to take advantage of this increase. It is considered better to allow it, to provide an additional local factor of safety at welds.

The beam for the Curtiss Teal, designed later than the Kingbird, is illustrated in Fig. 1. This is a tapered wing monoplane design built in three sections. The large center section is in one piece and so eliminates the usual hinged joints, which must carry heavy loads. These beams were heat treated to a tensile strength of over 125,000 lb. per sq. in.

Stinson beams, Fig. 2, are characterized by the use of round tubing of constant section along the entire length of each flange member and by simple butt-welded truss tubes. The hinge and lift fittings are wrapped around the tubes and completely welded. Rib clips are small flanged "U" pieces. Each front beam carries a series of five tripods which support guide bearings through which the aileron control mechanism operates. The main section of the beams is 24 ft.

long and is heat treated in one piece to a minimum tensile strength of 180,000 lb. per sq. in. The tip sections, about 3½ ft. long, are joined after heat treatment, the normalized strength of 95,000 lb. per sq. in. being sufficient at this position. These beams are excellent examples of practically one-piece beam construction, heat treated to strengths formerly used only on axle members. Their manufacturing advantages have already been proved and their reliability is evidenced by the performance of the Stinson 10-passenger, three-motored airliners now in operation on the New York-Philadelphia-Washington Airways.

Fairchild has also designed and built steel wing beams for a special type of plane used by the Army in photographic work. This beam is illustrated in Fig. 3. The arrangement of the truss system is interesting, as it presents a design which shows unusual care in varying the beam strength according to the load variation by means of modification of the truss rather than by changes in the flanges, as in the Curtiss Kingbird. Heat treatment develops a strength of 160,000 lb. per sq. in.

Chance Vought engineers have made a center section beam, illustrated in Fig. 4, which has shown satisfactory characteristics under test. Here, as in the Teal, the chord members are elliptical and the web truss joints reinforced with gussets. The beam is both pleasing in appearance and efficient in design. Heat treatment to 150,000 lb. per sq. in. minimum was specified.

Bellanca developed the beams illustrated in Fig. 5 for use in relatively shallow depth surfaces. The tubing is all round in section and the truss is without gussets. These beams also had a minimum strength of 150,000 lb. per sq. in.

While not distinctly wing beams, the mid-ship carry-through members between the wings have the same heavy loads and are of the same type of design as the wing beams themselves. In fact, there are numerous examples of heat-treated welded tubular wing root members built into the fuselage. Fig. 6 shows a General Airplane center section, which saved 75 lb. weight per ship over the corresponding wood design, and Fig. 7, a part of the Berliner-Joyce fuselage. Such relatively simple truss forms are, of course, heavier in section than the attaching wing spars. Nearly all the tubing used in these beams was furnished by the Summerill Tubing Co. Annealed tubing is usually specified, since heat treatment always follows and the advantages of normalizing are sacrificed.

(Concluded on page 755)

Mining Engineers Hold Annual Meeting in New York

IN attendance, the 104th general meeting of the American Institute of Mining and Metallurgical Engineers, Feb. 16 to 19, was one of the largest in its history. It was held, as usual, at the Engineering Societies Building in New York.

Each of the various divisions of the institute listened to carefully prepared technical programs. At the four sessions of the iron and steel men, 13 papers were delivered in addition to a round table meeting on iron ore. There were also 13 scheduled papers at the three sessions of the institute of metals. And the two annual lectures, under the auspices of each division, added materially to the technical feast.

Technical Papers on Iron and Steel

Besides the iron ore round table, there were two sessions on physical metallurgy held by the iron and steel division, at which several important papers on open-hearth practice were presented. These will be reviewed in an early issue of THE IRON AGE.

An important session on the blast furnace heard five papers by Prof. R. S. McCaffery of the University of Wisconsin and his associates. These presented the results of investigations which have been under way for the past six to eight years. The program was introduced by a paper by T. L. Joseph and two co-workers on "High-Manganese Slag in the Electric Furnace," which is a contribution to Mr. Joseph's well-known researches in the study of the recovery of manganese from low-manganese ores in the form of a ferromanganese.

There was also one session on miscellaneous topics involving blue brittleness, growth of cast iron and bright annealing in hydrogen. All the sessions were characterized by large attendance.

Two Notable Lectures

The main auditorium was filled and paid a tribute to the annual Howe memorial lecturers—Dr. F. F. Lucas of the Bell Telephone Laboratories, New York—on Wednesday afternoon, Feb. 18. He is known internationally for his researches in high-power microscopy and has lectured in Japan and other foreign countries. Taking as his subject, "On the Art of Metal-

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H. G. Moulton, consulting mining engineer, New York.

William Wraith, Inspiration Copper Co., New York.

lography," Dr. Lucas delivered a dissertation which, while of a very high order, was general in its nature and a fine contribution to the literature.

It is the custom of the institute of metals to, alternately each year, invite a foreign scientist to deliver the annual lecture. This year the honor fell to Prof. Arne Frederik Westgren, Ph.D., of the University of Stockholm, Sweden. On Thursday afternoon a large and representative audience listened to his able presentation of the subject, "X-Ray Determination of Alloy Equilibrium Diagrams."

New Officers for Next Year

At the annual meeting of the institute the results of the balloting for officers for the year 1931-1932 were made public. They are listed in another column. The new president, Robert E. Tally, vice-president of the United Verde Copper Co., at Jerome, Ariz., was graduated from the University of Nevada with the degree of B. S., later receiving the degree of mining engineer. He joined the Verde company in 1907 as a timberman, ad-

vancing by steady promotions to his present position. The new officers were inaugurated at the annual banquet on Wednesday evening, Feb. 18.

Several Medals Awarded

The annual distribution of awards was made at the annual dinner and dance held at the Hotel Commodore. The 1931 presentation of the William Saunders gold medal, one of the highest awards to a mining engineer, was made to Francis W. MacLennan, general manager, Miami Copper Co., Miami, Ariz. In 1928 this medal was awarded to President Hoover, a past president of the institute. The medal was established in 1927 for presentation once a year "for distinguished achievement in mining." Mr. MacLennan has performed unusual work in the mining of low-grade copper ores.

Another high award of the institute is the James Douglas medal "for distinguished service in non-ferrous metallurgy." The 1931 award of this medal was made to William H. Peirce, president, Peirce-Smith Converter Co., Baltimore, for numerous designs and improvements of devices and machinery for smelting, refining and rolling copper.

Edmund S. Davenport, a member of the staff of the research laboratory of the United States Steel Corp., Kearny, N. J., received the Robert W. Hunt prize this year for his studies in cast iron, tungsten, thorium and the transformation of austenite at constant sub-critical temperatures.

Honorary membership was conferred on Waldemar Lindgren, head of the department of geology of the Massachusetts Institute of Technology.

New Members of the "Legion of Honor"

Men who have been members of the institute for 50 years constitute the group of "Legion of Honor" in conformity with a custom initiated in 1929. This year "the class of 1881" of 12 living members brings the legion's membership up to 52. The class this year includes the 83-year old Joseph W. Revere, Canton, Mass., a grandson of Paul Revere; the veteran mining engineer, John Hays Hammond, who will be 76 in March; and Ralph

Crooker, another veteran, who lives in Acton, Mass.

Guests of honor at the banquet included Dr. Arne Westgren of Sweden and Dr. F. F. Lucas of New York, the two lecturers this year.

Officers of the Steel and Non-Ferrous Divisions

New officers for the coming year of the iron and steel division are as follows:

Chairman, Dr. F. M. Bickel, vice-president, J. C. Pott & Co., New York.

Vice-chairman, F. H. Murray, Cleveland; W. E. Ridel, Ironworks Metallurgical, General Electric Co., Schenectady, N. Y., and E. N. Speller, Metallurgical engineer, National Tube Co., Pittsburgh.

Directors for three years: C. B. Albrecht, New York; J. T. MacKenzie, Chicago; and G. B. Waterhouse, Cambridge, Mass.

The institute of metals division held its annual dinner and meeting at the Hotel New Yorker, Thursday evening, Feb. 19, when announcement of the new officers for 1931-1932 was made as follows:

Chairman, Sam. Yoon, vice-president, Lucius Pott, Inc., New York.

Vice-chairman, J. A. Frechman, Jr., American Brass Co., Waterbury, Conn., and C. H. Mathewson, professor of metallurgy, Yale University.

Executive committee: W. M. Peirce, Baltimore; A. J. Phillips, metallurgist, South Alia, Va.; Waterbury, Conn.; and J. L. Bell, consulting engineer, New York; and J. G. Zink, Jefferson, Ohio.

The address of the evening was made by Dr. G. W. Thompson, chief chemist, National Lead Co., whose subject was "Lead."

A new plan for the annual smoker this year was successfully inaugurated. It consisted of a dinner combined with the smoker, followed by a vaudeville entertainment. There was an attendance of about 550 men in the ballroom of the Hotel Pennsylvania.

Meetings of Society Committees

On each day there were several meetings of important committees of



ROBERT E. TALLY
President

national technical societies. Among them were the following: Committee on heat treatment definitions, American Society for Steel Treating; committees B-4, B-6, B-3 and E-4 of the American Society for Testing Materials; advisory committee, non-ferrous division of the American Foundrymen's Association and the joint research committee of the A. S. T. M. and the American Society of Mechanical Engineers on the effect of temperature on the properties of metals.

Empire Steel Corp. to Undergo Refinancing

The Empire Steel Corp., Mansfield, Ohio, has announced refinancing plans, under which the capital will be reduced from \$14,200,500 to \$7,616,900. It is proposed to reduce the present capital of 550,000 no par common

shares and 150,000 \$100 par 7 per cent preferred shares to 75,000 shares Class A and 100,000 shares Class B stock, both without par value. The old preferred is to be exchanged on the basis of one share of new Class A for each five shares now held.

The plan provides for issuing \$2,000,000 in 15-year 6 per cent bonds, which \$1,780,000 will be offered to stockholders in units of \$100 bond and two shares of Class B stock for \$100. A substantial interest in the Empire Steel Corp. was recently acquired by Pickands, Mather & Co., Cleveland. Its plants are located in Mansfield, Cleveland, Ashtabula and Niles, Ohio.

Wholesale Price Trend Still Downward

Prices of commodities at wholesale, as reported by the United States Bureau of Labor Statistics, in January reached a new low figure for the current movement. The index is given as 77, a drop of nearly 2 per cent from the 78.4 of December, and almost 18 per cent below the 93.4 of one year earlier. The decline has been continuous since July, 1929, with the exception of a brief hesitation in the summer of 1930.

Every one of the ten major groups of commodities shows a decline in January, and most of these were from 1 to 3 points. Only in metals and metal products, fuels and lighting material and house-furnishing goods were the declines fractional.

In the metals group, which went down from 90 in December to 89.3 in January, there was an actual rise in the iron and steel component, going from 88.0 to 88.1. Non-ferrous metals dropped from 69.7 to 67.4, and there were fractional drops in agricultural implements, automobiles and other metal products.

THE 1931 LECTURERS AND MEDALISTS

Dr. Lucas was the Howe memorial lecturer and Prof. Westgren the institute of metals lecturer. Mr. MacLennan was the Saunders medalist and Mr. Peirce the Douglas medalist. Mr. Davenport was awarded the Hunt prize.



F. F. LUCAS



ARNE F. WESTGREN



W. H. PEIRCE



F. W. MACLENNAN



E. S. DAVENPORT

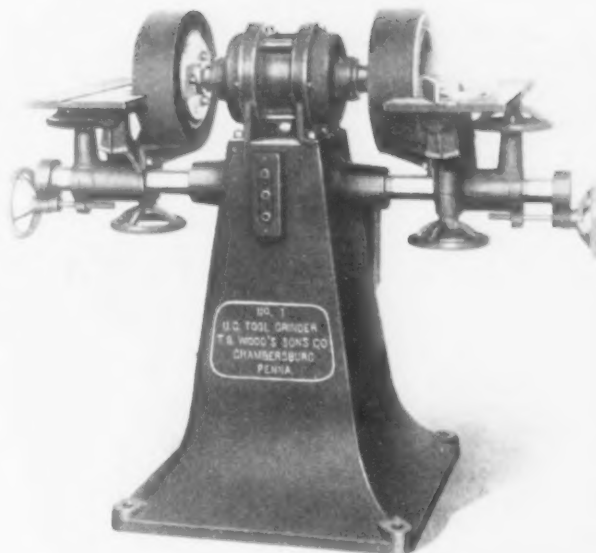
Grinds Both Tungsten Carbide and High-Speed Steel

TUNGSTEN CARBIDE and other hard-alloy-tipped tools, as well as high-speed steel, may be ground accurately on the Universal Giant tool grinder recently developed by the T. B. Wood's Sons Co., Chambersburg, Pa.

The machine is equipped with two tilting tables that may be set accurately at the required angle from the horizontal, a quadrant and indicator being provided to assure correct settings. The tables carry a tool guide which is mounted on a straight edge that travels in slotted ways parallel to the edge of the grinding wheel. The tool guide may be set at any angle to the cutting edge of the wheel by properly adjusting the tractor which is integral with the guide. Tables and guide are used as rests and guides only; the actual grinding is a hand operation. Sharpening is done with the edge of the wheel rim, a feature emphasized as making for long wheel life. The wheel velocity is always the same, about 5600 ft. per min.

Either motor or belt drive arrangement can be supplied. For the former $1\frac{1}{2}$ -hp. 1800-r.p.m. reversing ball-

▲ ▲ ▲
THE tilting tables carry a tool guide; means are provided for accurate angular settings of both tables and tool guides.
▼ ▼ ▼



bearing motor is employed; for belt drive a 4 x 4-in. pulley on the wheel spindle and a reversing countershaft are supplied. With the reversing drive the wheels may be run in either direction and either right or left-hand tools sharpened. The insert or tip of the tool being ground is always on top in plain view of the operator, and the wheel rotates toward the tip instead of away from it.

Two 12 in. x 4-in. grinding wheels, one 60 grain and one 120 grain, for

rough and finish sharpening, respectively, are furnished. A finer stone, 200 to 400 grain, may be employed to produce the equivalent of a lapped edge. With suitable wheels, tungsten-carbide tools may be sharpened on one stone and high-speed steel on the other.

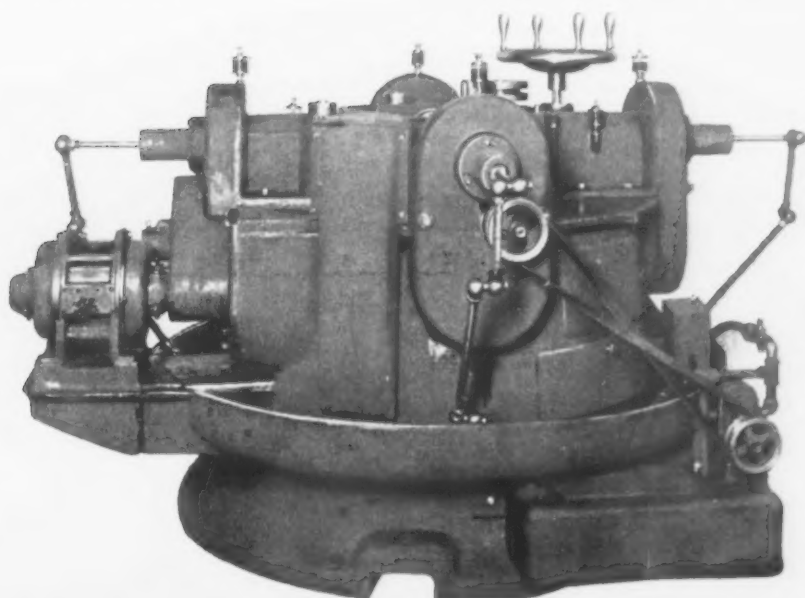
Rigid and balanced construction to eliminate vibration is a general feature of the machine. The spindle is of alloy steel and is mounted in oversize ball bearings having dust seals.

Four-Way Drilling and Turning Machine

THE four-way drilling and turning machine illustrated was designed by the Reed-Prentice Corp., Worcester, Mass., to drill four holes, turn four diameters or mill four surfaces simultaneously. It is adapted for drilling

universal joint rings, turning differential spiders and similar automotive production work.

The machine consists of four heads mounted on the table forming the top of the bed. Each head contains a



spindle driven through helical gears from four spindle drive shafts and a cluster of bevel gears inside the bed. One of these shafts extends outside the bed and on it is mounted a tight and loose driving pulley; if desired, this shaft may be equipped for motor drive. In either case the power is transmitted through gears to the entire machine. In case of electric drive, the motor is mounted on a bracket clamped to the side of the bed.

The spindles are free to slide back and forth in the heads, and four vertical shafts, one in each head, have pinions meshing with steel racks in the spindle bearings. Four gears on the lower end of each shaft mesh with a large central spur gear receiving its drive indirectly from a spindle drive shaft, thus providing power feed to each spindle. This feed is engaged by a handle on the left-hand side of the machine. The drive operating the endwise movement of the spindles contains a set of gears which provides for feed changes.

The upper portion of one vertical feed shaft has a large handwheel by means of which all spindles can be moved backward or forward simultaneously. At the top of the rear head is a drum carrying an adjust-

able dog which rotates with the shaft which slides the spindle. As the dog travels in its circular path it comes in contact with a sliding plunger and in pushing the plunger downward, disengages the power feed. Thus the spindles may be tripped automatically and then, by use of the handwheel, brought back to the starting position.

Each spindle is arranged with a sliding inner sleeve which can be placed in any desired endwise position, regardless of the location of the spindle. The sleeves are regularly equipped with No. 5 Morse taper and

made fixed by hardened taper bushings and clamping collars on the nose of the spindle. This construction permits the cutters or drills to be set in exact relation to one another, and also permits the resetting of any tool after it has been reground. By this means standard drills may be used until they become too short for any possible use. Special fixtures are required for holding the work.

Two sizes of the machine are made. In the smaller, the No. 1, the distance between heads is 14 in., and in the larger, the No. 2 machine, the distance is 26 in.

New Internal Precision Grinder

UNDERSLUNG drive is a feature of the internal grinding machine recently brought out by the Wicaco Machine Corp., of Wayne Junction, Philadelphia. The specially-built General Electric motors that form the driving units for work head and carriage are hung on the doors of the heavy bed, thus becoming readily accessible for inspection when the doors are opened. The wheel-drive motor is hung directly under the center of the carriage so that the ways rather than the heads absorb the torque. All drives have constant tension devices and are self-adjusting.

The work-head is of rigid design, and over-size bearings are provided for the work-spindle. A rheostat on the variable-speed motor provides 16 speeds for the work. The wheel-head is provided with a patented water jacket which surrounds the bearings and their oil chambers and which is for the purpose of permitting contin-

uous operation without temperature rise. It is claimed that this feature, by maintaining the uniform viscosity of the lubricant, has the effect of eliminating the possibility of chatter and also reduces journal wear. Adjustable end-float is provided for the safe grinding of shoulders.

The wheel-head is mounted upon the upper of two cross-slides, permitting a quick setting for taper or a step-over for two or more diameters. Both automatic and hand cross-feeds are provided. The wheel feed is automatic at each end of the carriage travel, or will feed straight into the work with the carriage stationary if desired. The automatic feed can be raised by steps of 0.0002 in., from zero feed to 0.001 in. per stroke.

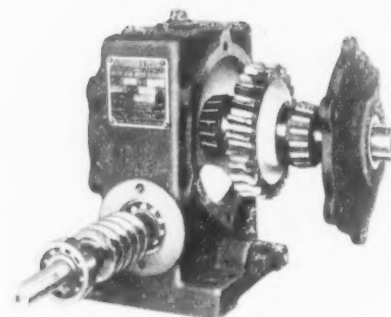
The carriage is driven by a variable-speed motor giving 16 speed variations and will traverse on a movement of 0.001 in. An automatic reversing device for the traverse move-

ment provides for safety should any obstruction come between a fixed part of the machine and its moving carriage or wheel.

All revolving parts of the machine are adjusted for dynamic balance. The grinder will swing 12 in. inside the water guard and will grind a hole 18 in. deep. The operating floor space is 78 in. by 29 in., and the weight of the machine is 2400 lb.

New Speed Reducers

TWO small worm-gear speed reducers designed for worm rotation in either direction have been added to the line of speed reducers made by the Horsburgh & Scott Co., Cleveland. The worm is forged integral with the shaft to insure rigidity, by making possible the use of larger diameters, and to assure concentricity. The worm threads are glass hard and ground after hardening. The gear is

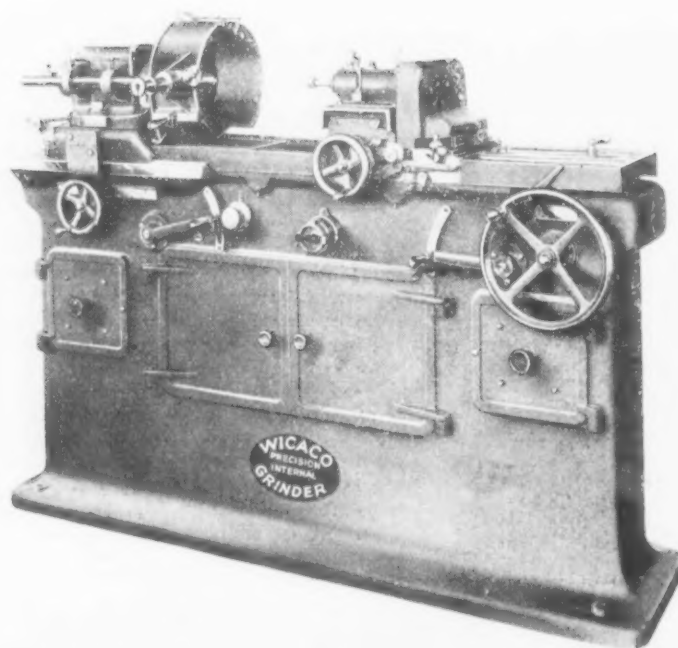


of bronze and has a wide face to increase load capacity; it is generated by a hob, which being an exact duplicate of the worm assures perfect bearing surface. The worm shaft has Gurney radial thrust bearings and the gear shaft Timken roller bearings.

The housing is of one piece and has heavy external ribbing which carries the bearing loads to the base of the unit. It is sand-blasted inside and out and the interior is free from projections or brackets which may cause oil swirls in the reservoir. The unit is self-lubricating; contact between the worm and gear is always beneath the oil surface and the worm and gear bearings are also lubricated from this source. Oil seals on both shafts together with gaskets make an oil-tight unit. A welded steel bed plate is provided in case it is desired to have the reducer and motor mounted on a bed plate.

Horsepower ratings range from 5.4 at 1800 r.p.m. downward in the larger size and 4.3 downward at 3000 r.p.m. on the small size. Ratios range from 4 1/6 to 1 and from 60 to 1.

Geometric Tool Co., New Haven, Conn., has appointed the J. H. Ryder Machinery Co., Terminal Warehouse Building, Toronto, Ont., as its Ontario sales agent.



HUNG on the doors of the heavy base, the driving units are readily accessible for inspection. The water-jacketed wheelhead is another feature.

Tantalum Carbide—a New Cutting Tool Material

TANTALUM carbide combined with nickel is being offered under the trade name of Ramet, a new hard cutting material, by the Fansteel Products Co., Inc., North Chicago, Ill. Advantages of this material, as set forth by its producer, are: it is harder than many hard cutting alloys; it cuts alloy steels, cast iron and steel, non-ferrous metals, synthetic plastics, etc.; it may be used for both rough and finish cutting; its cost compares favorably with other products used for similar purposes; and it has a low thermal conductivity.

The entire process of manufacturing Ramet is performed by the Fansteel company. Tantalum-bearing ore obtained from Australia is reduced, and the metal is changed to the carbide form. The tantalum carbide is then ground and thoroughly mixed with nickel. This mixture is then pressed to size and form in a hydraulic press, allowances having been made for shrinkage. The press operation does not affect the physical characteristics, but merely gives the product the form in which it can be used.

After having been pressed the material is sintered in an electric furnace under controlled atmosphere. The product as it comes from the sintering furnace is finished in all respects except that, untreated, it cannot be brazed. Therefore it must be nickel plated and then heat treated in a controlled atmosphere after which it can be brazed to a tool shank with copper or any of the commonly used brazing materials.

Physical properties so far determined are: melting point of tantalum carbide approximately 4100 deg. C.; hardness, 89½ to 90½ on the C scale when using a Rockwell machine with a 60 kg. weight; and a computed ultimate tensile strength between 250,000 and 300,000 lb. per sq. in.

Ramet is at present being made only in one grade. It will not withstand shock and strain as will tool steel; the design of tool holder and method of mounting, therefore, are important. It is being successfully used for cutting Bakelite. It readily cuts 10 to 15 per cent manganese steel castings. A 3-in. soft steel bar can be reduced 1 in. on the diameter, that is, a ½-in. deep cut, with a feed of 0.020 in. and at a speed of 170 ft. per min.

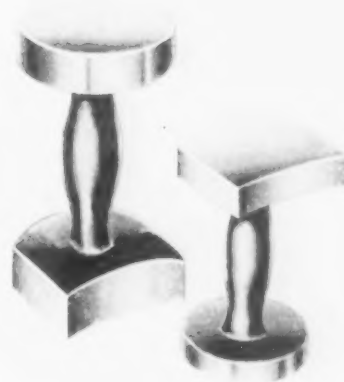
A thermal conductivity less than one-third that of tungsten carbide is claimed. Tools made of this material keep cool, and tests are said to show that the work remains comparatively cool also. The low thermal conductivity is a safeguard against destruction of the brazed joint, and is an advantage also in cutting hardened high-speed steel when using 10 to 15 deg. negative rake.

Application to types of tools and their use covers about the same range as is practicable with tungsten-carbide tools. The life between grinds, methods of dressing and cutting angles also are similar. The material will be supplied to any manufacturer by the Fansteel Products Co. The company does not intend, however, to

set up in the tool-making business, but will make the metal Ramet only. For the convenience of users, a limited number of tool manufacturers have been appointed as distributors, and these tool makers will cooperate in the design and application of the Ramet-tipped tools.

Hand Dollys for Sheet Metal Shops

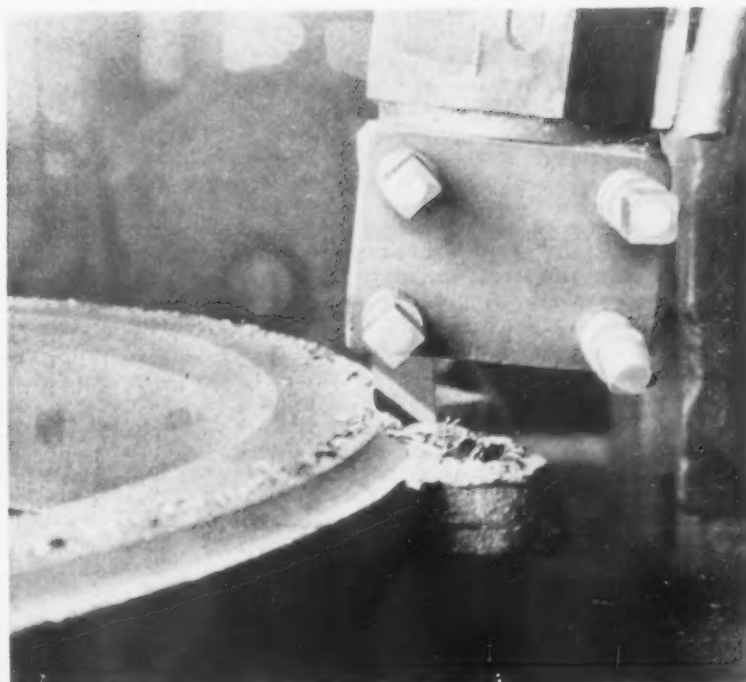
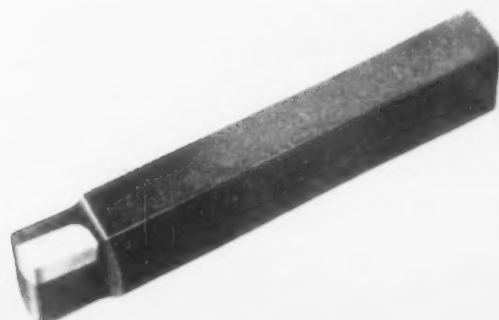
A NEW drop-forged dolly that can be used in seven different positions and is designed so that it will not roll when placed lengthwise on a



bench or other flat surface is being manufactured by the Whitney Metal Tool Co., Rockford, Ill.

Two sizes are made; the larger weighs 7½ lb., and the smaller, which fits in a tool box, weighs 3 lb. Both have machine surfaces and are hardened.

THE tantalum-carbide tip may be brazed to the tool shank with copper or any of the common brazing alloys. Low thermal conductivity of the tip material is emphasized as a safeguard against destruction of the brazed joint. The Ramet-tipped tool at right is used for machining hard cast iron car wheel chills—removing ⅝ in. of scale and metal in one cut. Marked increase between tool grinds featured this application.

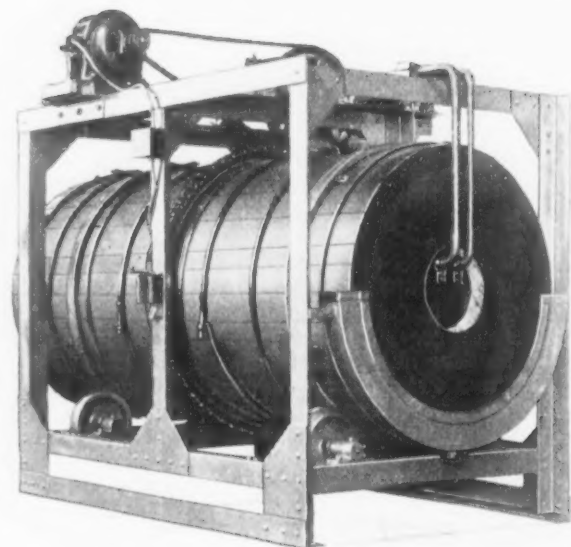


Automatic Equipment Cleans, Plates and Dries Small Metal Parts

OPERATIONS in finishing small metal parts in the Brooklyn, N. Y., plant of the American Safety Razor Corp., have been made continuous and automatic, thereby reducing production costs. One of the major installations for accomplishing these results is automatic equipment for cleaning and preparing parts for plating.

Stamped backs for safety razor blades are delivered in batches of 400,000 ft. from stamping presses to the power loader of the cleaning machine. The loader dumps them into a drum where they are rolled to a potash solution, which removes press grease and burrs and gives them a water finish. They then pass through a

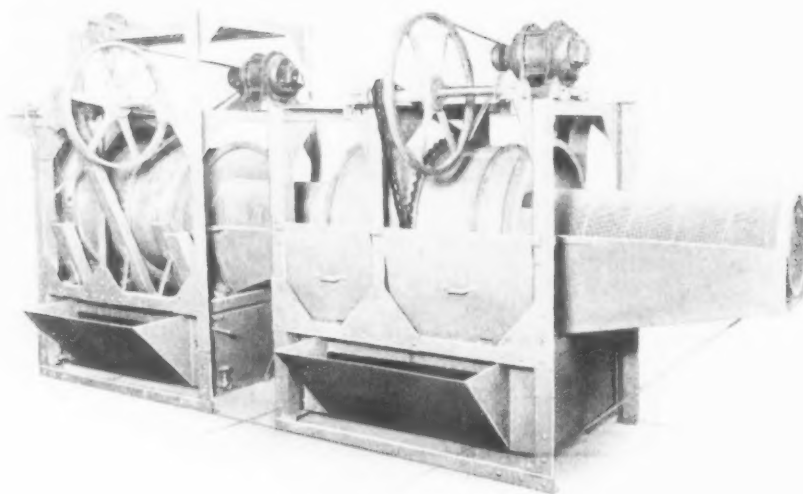
THE safety razor backs go through the cleaning unit (below), the plating barrel (at right) and then through the water and soap dips and the dryer (at bottom of page). Operation is automatic and continuous.



is dried by being tumbled in hot sawdust. From the barrel the parts pass through a screen which separates them from the sawdust. The sawdust is returned to the barrel on a steam-heated conveyor. In this way the bar-

rel has a constant supply of warm, dry sawdust.

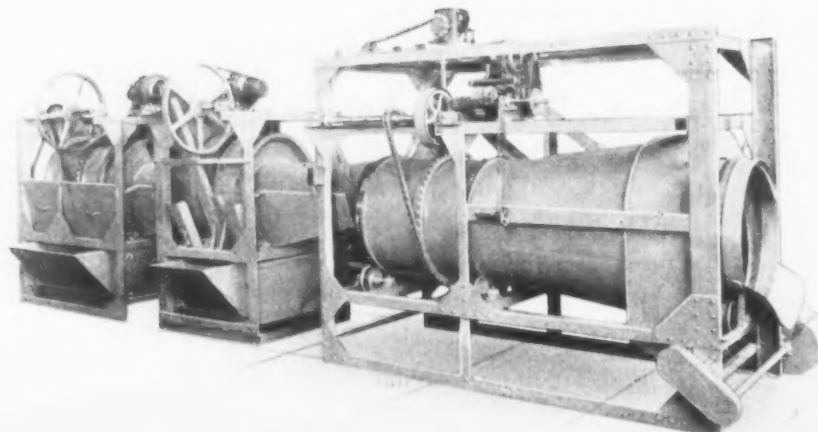
The entire installation is set up on three sides of a rectangle. The work is handled in batches, each batch staying in each unit about half an hour and being transferred automatically from unit to unit. This process prevents two batches from mixing. One man takes care of the entire job. In addition to labor saving this equipment, which was designed and built by N. Ransohoff, Inc., Cincinnati, gives the parts a more uniform finish, economizes in the use of floor space and results in a more uniform flow of production.



draining screen to a rinsing drum, where they are rolled a second time and go through a second draining screen. At this point the parts are ready for plating.

Plating formerly was done in six small tilting plating barrels, the work being handled manually immediately before and after the plating operation. These have been supplanted by an automatic plating barrel which receives the parts from the rinsing drum, plates and discharges them into a cold-water drum.

In this drum the work is rolled in cold water, thence going through a drum for a dip in soap solution, from which it travels through a drain screen to a sawdust barrel where it



A booklet of about 90 pages has been issued by the Aluminum Co. of America, entitled "Alcoa Aluminum for Truck Bodies." The company for several years has been conducting extensive experiments in the use of light aluminum alloys for the construction of the main body of trucks. This pamphlet presents full details of the results of these experiments, which have been conducted on a large scale in various cities of the United States by numerous companies using trucks of this type.

Introduces New 1-In. and 1½-In. Threading Machines

THE Landis Machine Co., Inc., Waynesboro, Pa., is placing on the market a threading machine of new design. This threader, named the Landmaco, is built to modern machine tool standards and, in keeping with the general design, will be

rigid, and is closed as the carriage is withdrawn. The yoke also has a lever to permit opening or closing the die head by hand.

The carriage is gibbed and is operated either by rack and pinion or a lever. The guides are completely pro-

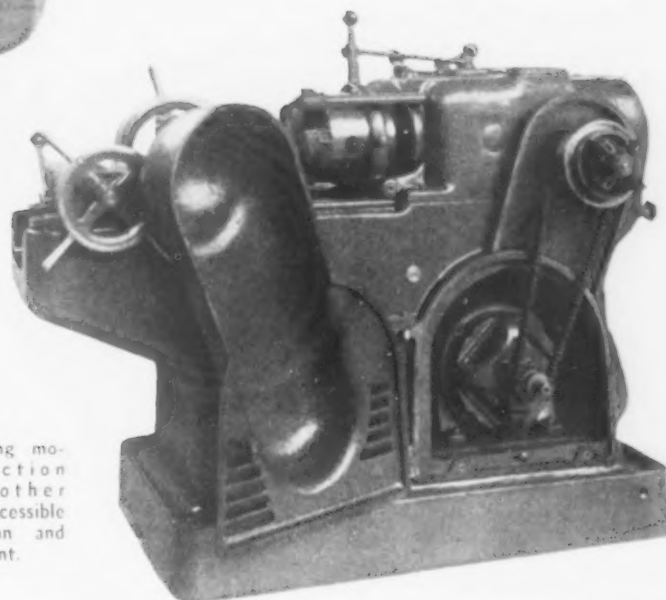
into the bed and can be removed for inspection without disconnecting any piping.

Made of semi-steel and cast in one piece, the bed is reinforced by an inner wall and forms a rigid support for the carriage and headstock. Large drains below the guides and at the base of the bed return the coolant overflow to the reservoir.

The leadscrew, which is optional, is located centrally between the guides of the machine and takes the thrust load without binding the carriage. It is mounted on large pre-loaded ball bearings that automatically eliminate end play. The leadscrew has a coarse pitch thread with a rounded crest, a design intended not only to facilitate engagement of the nut, but to lengthen the life of the unit. The leadscrew is inclosed in a steel tube to protect it from chips and dirt. The leadscrew nut, made of bronze, is of split full-nut type, and the two segments, each equivalent to



EIGHT speeds are obtained through the selective type gear box, which is integral with the head.



THE driving motor, friction clutch and other parts are accessible for inspection and adjustment.

equipped with heat-treated and ground Lanco heads. It is available in 1-in. and 1½-in. sizes, single and double-head.

Arrangement of the machine may be seen in the illustrations. The single-pulley drive includes an adjustable friction clutch to start and stop the machine; mounted at the outer end of the main drive shaft, this clutch is readily accessible. The gear box is of selective type and has eight speeds. It is integral with the headstock. Anti-friction bearings are used throughout. The gears are made of chrome-nickel steel, are hardened and burnished and are mounted on heat-treated alloy steel shafts. Speed changes are effected through conveniently-located levers. Both the bearings and the gears are lubricated automatically by a flood system.

The double-head machines, when equipped with lead-screws, have a reversing mechanism in the gear box for reversing one spindle. This mechanism can be supplied with the non-lead screw machines.

The spindle is driven by spiral bevel gears. The bearings at the die head end are unusually large and are pre-loaded; this type of bearing eliminates the end play which would otherwise develop through wear. The die head is placed close to the front spindle bearing to minimize overhang. It is opened through a yoke by the forward movement of the car-

riage, and is closed as the carriage is withdrawn. The yoke also has a lever to permit opening or closing the die head by hand. The carriage is gibbed and is operated either by rack and pinion or a lever. The guides are completely pro-

ected by guards and wipers. The guards are attached to the front of the carriage and pass under the headstock; the wipers are located at the rear end of the carriage and are adjustable for wear. The guides are lubricated automatically by felt pads which are located in the base of the carriage and fed from a central oil reservoir.

Horizontal side adjustment, as well as vertical adjustment, is provided for the vise, a distinctive feature emphasized as making possible extremely accurate alignment between the die head and the work. The heavy rim of the vise handwheel acts as a flywheel and reduces the effort required to grip the work. The vise jaws are driven by renewable bronze vise screw nuts.

a half nut, are made exceptionally long to increase their life. The leadscrew nut has direct contact with and takes the thrust load of the carriage, relieving the carrier of strain. A third adjustable half-nut, also of bronze, is employed to take up the backlash. The contact surfaces of the leadscrew and nut are lubricated automatically from a reservoir in the carriage. The supply is controlled by filtering the oil through a wooden plug in the leadscrew nut.

The pitch change gears are housed in a gear box at the headstock end of the machine, while the intermediate gears are carried in a circular slot in the base of the gear box; this arrangement is emphasized as assuring a rigid support for the entire gear train.

When arranged for motor drive, the driving motor is mounted in a compartment in the bed, as shown, and connected to the main drive shaft by silent chain.

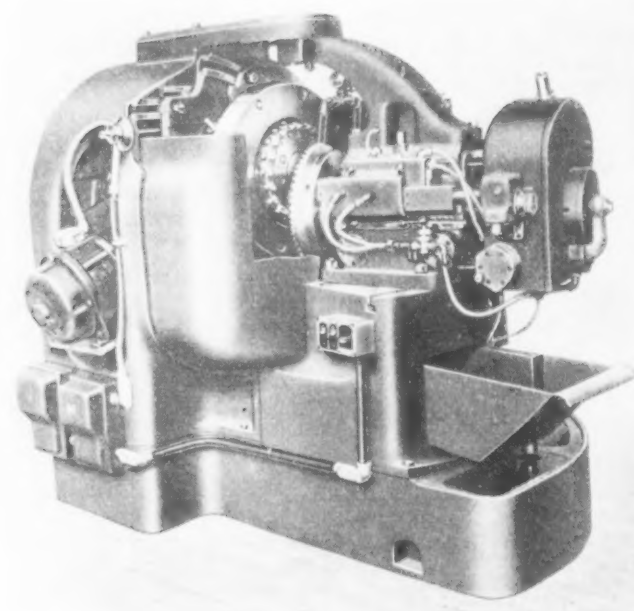
Hydraulic Spiral Bevel Gear Rougher

Reduces Production Time

MARKED increase of production in roughing spiral bevel gears is made possible by the hydraulically-operated machine illustrated, which has been brought out by the Gleason Works, Rochester, N. Y.

This machine, of entirely new de-

sign, is said to reduce by 60 per cent the time required for rough cutting these gears. The outstanding feature is full-automatic operation, all movements being effected hydraulically. Special safety features are embodied to minimize the danger of breaking the cutter, while operation of the machine has been made as fool-proof as possible. This rougher has been designed for use with the Gleason spiral bevel gear generators, which finish the roughest gears.



The cutter-spindle housing is bolted directly to the base of the machine and the work-spindle housing is bolted to the frame. An overhead tie between the two heads adds rigidity. The motors are mounted in the machine and coupled direct. The control valve and electrical switches are all grouped for the convenience of the operator. All servicing can be done while the machine is in operation.

After the gear blank and clamp plate are put on the spindle by the operator, the work is hydraulically chucked by opening a valve; pushing the starting button then moves the head into position and starts the cutter motor. No generating motion is employed, the tooth slots being cut by a simple depth feed motion of the cutter into the work. After each slot is cut, the cutter is withdrawn to permit the work to be indexed.

The cutter drive is through a pinion and an internal gear bolted to the cutter spindle faceplate. Change gears for obtaining various cutter speeds are conveniently located.

The cutter spindle is mounted in a saddle in the upright. The entire saddle assembly is adjustable both horizontally and vertically for setting the cutter for the proper spiral angle. Provision is made for taking up cutter wear. The cutter spindle is

THE hydraulically-operated rougher is for use with Gleason generators, which finish the spiral bevel gears.

BEGINNING with hydraulic chucking of the gear blanks, all operations are automatic. One operator takes care of several machines.

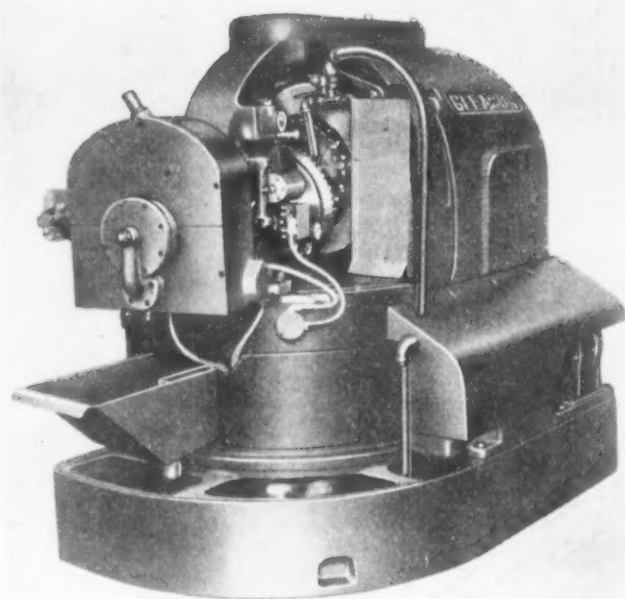
rigidly designed, and is mounted on large precision anti-friction bearings which are assembled under sufficient initial load to eliminate radial or axial deflection. The spindle nose is ground to size with the spindle mounted in place to secure an extremely accurate cutter mounting. The feed movement is on the spindle sleeve in which the cutter spindle is journaled and is hydraulically operated. Depth of feed is varied by an adjustable stop screw, while a control valve makes it simple to change the feed (time per tooth) hydraulically.

The cutter drive is through a pinion and an internal gear bolted to the cutter spindle faceplate. Change gears for obtaining various cutter speeds are conveniently located.

The heavy flywheel on the spindle faceplate makes for smooth action.

The work-head has the usual angular and linear adjustments to accommodate gears of various pitch angles and cone distances. The work-spindle remains stationary except when the work is indexed. Two clamps operate automatically and with equal tension to secure the work spindle-sleeve. When all of the teeth are roughed, the work is automatically moved away from the cutter.

The hydraulic work chucking mechanism is an integral part of the machine. Gears are chucked by being drawn back against a shoulder on the arbor by the draw-rod which extends to the back of the work spindle. The work is held in place by a spring which is automatically released, hydraulically, when the head backs away from the cutter after the last tooth is roughed out. The draw rod is adjustable for length, and the chucking mechanism (except the arbor) can be used for any gear of standard design. This arrangement greatly reduces the time and effort required to change the work, and enables the



operator to take care of a larger number of machines.

Index mechanism is of notched-plate type and is actuated hydraulically. Change from one number of teeth to another merely involves changing the index plate and the automatic stop setting. The automatic stop, which stops the machine when the last tooth is cut, resets itself after each blank is roughed. It is changed from one number of teeth to another by changing the setting of a graduated dial.

Automatic lubrication, including sight glasses, is provided. Pressure for the hydraulic system is supplied by an individual unit contained in the machine. Standard Gleason roughing cutters, 9, 12, 15 and 18 in., are used on this machine.

Barometer Not Yet Ready to Turn Up

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

FAVORABLE FACTORS

1. The prices of several basic commodities have recently shown signs of greater stability.
2. Stocks of copper and zinc have rounded off and the prices of those metals appear to be bumping bottom.
3. The unfilled orders of the Steel Corporation increased more than seasonally in January.
4. Department store sales held up well in January.
5. The estimated dollar value of the total industrial output is below its average relation with the dollar value of wholesale trade.
6. Industrial production is low in comparison with railroad freight traffic.
7. Money rates continue at bottom levels, with speculative loans well liquidated.
8. The stock market has risen about 20 per cent from the December low.

UNFAVORABLE FACTORS

1. The trend of commodity price averages is still downward; steel scrap weak; farm prices the lowest since 1912.
2. Factory employment and payrolls reached new low levels in January.
3. Building activity continues at bottom levels; severe liquidation in real estate.
4. Railroad earnings in December showed large decreases in gross and net; January freight traffic (adjusted) continued to decline.
5. General Motors Corp., sales made an unusually small gain in January; automobile registrations disappointing.
6. Foreign trade at the lowest level since the War, with both exports and imports at new lows for the recession.
7. The bond market is recessionary in spite of easy money.
8. Commodity stocks still large; much frozen credit; abnormal collateral loans.
9. The P-V line, though gaining slightly, continues below normal.

AS I see it, the business recession is losing momentum. Various business indexes are likely to hit bottom during the next few months. But it does not seem that the process of readjusting supply to demand and of liquidating either bank credit or stocks of commodities has gone quite far enough to warrant any sustained upturn in general business. Business is definitely in the late stages of a cyclical recession, but is hardly ready to enter the expansion phase of a new cycle.

If the recent rise in the stock market and the January gain in iron and steel production should turn out to be indications of a little expansion in business, I think the expansion would prove to be temporary and be followed by a sort of "secondary" decline. There has been some danger all along that a little touch of "hang-over inflation" might appear as a result of the piling up of idle funds at New York. This is probably the chief explanation of the rally in the stock market.

The commodity markets (including pig iron and steel) do not appear to be in shape to take care of increasing production. It seems more probable than ever that no definite turn will occur until this condition changes. The best evidence of a turn will be found in a rise in the raw material group in the Bureau of Labor Statistics price indexes (which declined further in January), or in Bradstreet's index.

Clearly the bottom has not been touched by factory employment and payrolls. There seems to be no bottom for exports, nor for the average price of farm products. And while the stock market operators bid up the speculative favorites of the hour, the bankers still *hesitate to buy long-term bonds*.

Barometer Is Still Hesitant

NO significant development has occurred in the P-V line barometer. In the last few months the physical volume of trade (V) has declined at a slightly more rapid rate than commodity prices (P); therefore, the ratio between the two has become a trifle higher. The movement, however, is still essentially sideways at a level appreciably below normal.

This suggests a growing tendency toward stabilization of prices and a position near the bottom of the depression. It also suggests that the turn, when it does come, will be very gradual. In no case from 1919 to date has the final recovery from a depression not been preceded by a more pronounced rise in the P-V line than has yet occurred.

It still seems wise to regard the January rise in steel production as analogous to the premonitory upturn in May, 1921, and likely to be followed by further declines in our adjusted production curve.



Slightly greater gains in the P-V line (here plotted on 3-month moving average) would bring it to normal and foretell imminent business recovery. Readjustment is proceeding slowly.

W. W. MACON
Editor

THE IRON AGE

A. I. HINDLEY
Editor Emeritus

(ESTABLISHED 1855)

Theory and Practice in a Depression

THE complexities and wide ramifications of the maladjustments contributing to the current depression have not deterred theorists and politicians with a gift for phrase making but little comprehension of the dynamics of industry from prescribing legislative patent medicine for our economic ills. They do not seem to realize the risk of administering statutory remedies unsuited to the patient and only imperiling recovery. They ignore or are unaware of the fact that laws frequently have unlooked-for effects quite different from those sought.

Business men, on the other hand, are well aware of the harm that can be done by ill-advised legislation and, while by no means unsympathetic with efforts to cure economic maladies, are distrustful of paternalistic measures and the concomitant expansion of Governmental bureaucracy. They prefer to rely upon themselves for corrective action.

This attitude gave impetus to the trade association movement and in the past year has found expression in practical programs for the stabilization of employment. Industry rightly believes that the workingman wants a job, not a dole, and so far as practicable has provided him with at least part-time work.

The iron and steel industry has made an enviable record in preventing unemployment. In a recent address Myron C. Taylor, chairman, finance committee, United States Steel Corp., disclosed that the average number of employees in his company from Jan. 1 to July 1, 1930, was 221,123, compared with an average of 224,980 for the year 1929, and that during December, 1930, when plant operation was only 38 per cent of capacity, 226,614 were on the payroll. Similarly, reports to the President's Emergency Committee on Employment indicate that the flat rolled steel manufacturers and the bolt, nut and rivet makers have succeeded, by systems of labor rotation and other expedients, in taking care of most of their employees throughout the period of subnormal business.

Undoubtedly this policy has done much not only to prevent distress but to mitigate the severity of the depression. It reflects a spirit of humanity and of enlightened business statesmanship that distinguishes the current depression from all of its predecessors. It indicates that business leaders are thinking not merely of their own immediate advantage but of the interdependence of all industries and the essential solidarity of the interests of employer and employee.

Intelligent employers, moreover, have attacked the problem of unemployment in the most direct,

practical manner. While the agitator talked, they quietly did things. Without blare of trumpets, they divided available work among their men on a pro rata basis. In some cases they provided employment through construction or maintenance programs. In other instances they extended aid to the unavoidably idle by direct contributions or extensions of credit at company commissaries.

These measures increased costs at a time when they were mounting because of sharp declines in operations. Yet enlightened management has had little patience with theoretical disquisitions on the importance of removing all obstacles to the free play of economic forces. It is easier to talk abstractly of driving costs down to levels in keeping with lowered prices than to throw men out of work. It is simpler to point out the economic necessity of reducing wage rates than to cut the pay of employees who, on part time, are getting barely enough to subsist on.

Doubtless most of these employees would readily accept lower rates of compensation if there were assurance of immediate resumption of full-time work and consequently increased weekly earnings. But industry's present problem is to prevent distress. Employers and employees alike are making sacrifices in a spirit of comradeship and mutual help and understanding that will speed the return of sound prosperity, a prosperity that will rest on the firm foundation of cordial industrial relations, a prosperity that will not rely on superimposed legislation for protection against cyclical unemployment.

"Stainless" and "Rustless" Steels

CLARIFICATION of the nomenclature of certain steel products which have assumed a prominent role in industry lately is urgently needed. Reference is here made to the terms now being used indiscriminately to designate the products commonly known as stainless steels.

In general, there are two classes of the stainless or rustless steel products. One is the original stainless steel which was first discovered about twenty years ago and which is a relatively high-carbon, high-chromium steel, containing about 0.30 to 0.40 per cent carbon and 12 to 14 per cent chromium. This is still an important product, incorporated largely in cutlery and surgical instruments, and is known as stainless steel. It is, however, not malleable in the sense that it can be rolled into sheets, bars, structural shapes, etc.

In more recent years there has been developed a class of steels which can be rolled into the familiar staple mill products but which is much lower in carbon

than the strictly stainless steel. It contains usually below 0.12 per cent carbon, as well as varying quantities of chromium or chromium and nickel. The original type of these low-carbon products contains 12 to 14 per cent chromium with no other alloying element. This was first called "rustless iron." Later a material has been developed containing 16 to 18 per cent chromium, also low in carbon content. By far the most prominent of the low-carbon rust-resisting steels is the one known as "18 and 8," containing about 18 per cent chromium and 8 per cent nickel.

Besides these types, there is also a series of alloy steels, commonly called chrome irons, which contain higher percentages of chromium or chromium and nickel. And there are some types which have in addition other elements, such as silicon and molybdenum.

The necessity for clarification of terms appears when it is desired to distinguish between the higher-carbon material, which is strictly a stainless steel, and the low-carbon products, containing chromium or chromium and nickel, which are also frequently referred to in the daily and technical press as "stainless steels." Technically this designation is a misnomer for the low-carbon materials and it is contended that, until a better name is authoritatively determined, the term "rustless steel" should be used. Strictly speaking, the more widely used of these steels, the 18 and 8 type, are austenitic, but manifestly such a name does not lend itself to popular adoption.

It is hoped, therefore, that the term "stainless steel" can be restricted to the higher-carbon type. The selection of a distinguishing name for the newer and more widely used rust-resisting materials has been undertaken by a committee of the American Society for Testing Materials, but it will be months before a decision is finally reached.

Price Declines May Be Nearing End

HOPES recently entertained that the general decline in wholesale prices was practically completed have not been borne out, but from a close scrutiny of movements a suggestion is found that declines may be nearing their end, for declines have become irregular among the groups of commodities.

The January report of the Department of Labor shows an index number of 77.0 for all commodities, representing a decline of 1.4 points from December, and that is less than the decline in any of the three months preceding January.

The economic objection to price declines is that, when general, they represent an appreciation in the value of a dollar and, when dollars are expected to appreciate further in value, people like to put their dollars into savings banks or at least into bonds. Some have even used stockings or clocks, but that practice has been little in evidence this time, as indicated by studies of the amount of currency in circulation. There is no particular objection on public grounds to declines in a commodity price which has been too high by a general comparison, as they are likely to stimulate consumption.

It seems to be suggestive that the process of shaking out is nearing completion when prices of the

different groups of commodities decline by different amounts, and a comparison shows that to be the case. The general commodity index was practically the same for July, August and September of last year, since when fresh declines have occurred. Accordingly a comparison of last month with September is in point. For the longer range decline comparison may be made with the average of 1929, a very active year on the whole. It is seen that declines from 1929 have been much more regular than declines from last September, as is shown by the following comparison:

Percentage Declines in January

	From Sept., 1930	From 1929 Average
Farm products	13.8	29.5
Foods	10.2	19.7
Hides and leather products	10.6	18.9
Textile products	6.0	24.2
Fuel and lighting materials	8.5	14.3
Metals and metal products	2.7	14.3
Building materials	4.1	14.6
Chemicals and drugs	3.7	11.3
House-furnishing goods	4.5	6.0
Miscellaneous	7.2	19.6
All commodities	8.5	20.2

The figures in the first column do not hang together nearly so well as the figures in the second column. The recent declines have been more regular than the longer range declines. That suggests rather strongly that appreciation of the dollar has lately been less influential than formerly. Prices seem of late to have been finding their levels and relationships.

The swing in prices generally is shown below:

All Commodities at Wholesale

	1929	1930	1931
January	97.2	93.4	77.0
February	96.7	92.1	
March	97.5	90.8	
April	96.8	90.7	
May	95.8	89.1	
June	96.4	86.8	
July	98.0	84.0	
August	97.7	84.0	
September	97.5	84.2	
October	96.3	82.6	
November	94.4	80.4	
December	94.2	78.4	
Average	96.5	86.4	

Large and Small Concerns

WHEN large companies evince a determined desire to merge, it would appear that they are not satisfied with their size and that seems to be an unfavorable commentary on really small companies.

The matter is by no means so simple as that. From one angle it might be said that there are two classes of establishments, relatively large and relatively small respectively, each having its own particular alignment. The large need to be large because they are doing a large business, the small need to be small because they are doing a small business.

Of course, there are some small companies that

are simply trying to do the same kind of business on a small scale that the large companies are doing on a large scale. Unless they have advantages they are likely to fare poorly. The typical small company, so to speak, does have certain advantages. It picks out some special products in a given line, studies them minutely and adapts its service to the needs of its customers. The large company may have purposely renounced the idea of making the product, as being too small for it, or it may simply be unable to devote the necessary attention.

Measured in a tonnage way, the small company may be insignificant compared with companies making 10 to 40 per cent of the total product of the industry, but the little company may be making 25 to 50 per cent of the total production of a specialty. Then it may be less exposed to new competition than the large company, for a newcomer may nibble at the big tonnage of the large company and get enough to satisfy it, whereas a nibble from the small tonnage would do no good.

The history of the steel industry shows the working out of these principles. There are successful small concerns which started out making the common every-day product but gradually turned to specialties. Being in the trade gave them opportunity for observation, study and adaptation. Others

started in a small way, did not specialize and have disappeared.

The fact that relatively small companies can get along and large companies nevertheless want to grow still larger may seem curious, but there is a differentiation in both cases. There are certain penalties or responsibilities in connection with greatness. Large companies are continually wanting to "round out" their line by adding new things. They must, they feel, have "a full line." The small company, making specialties, never thinks of such a thing. In general, there is no such thing as rounding out with specialties, for the given customer may have need for nothing but the specialty. In addition to rounding out as to products the large company wants to round out geographically. In producing things sold on a small margin per ton, freights are an important item and geographically distributed plants a desideratum.

A distinct kind of merging is involved when a producer acquires a customer of competitors. The concern taken over buys mill products for further manufacture and the mill thus acquires an outlet. Years ago steel producers were rather averse to such vertical integration, but of late their views have been changing. There have been absorptions of that sort and there are likely to be more.

CORRESPONDENCE

Watch for Political Pied Pipers

To the Editors: There was an appeal in these pages recently for uncolored facts. This Macedonian cry has echoed through the ages. Therefore now is the time for all good readers to come to the aid of their trade paper. In a land where some of the highest salaries are paid in the amusement business, and where the papers with the largest circulation feature entertainment above information, it seems barely worthwhile to present any statement without placing a rainbow around its shoulder. Was it not the pragmatic Swedes who recently presented a medal to an American devotee of realism? And which of us heeded a certain Caledonian cabinet member when he told us the time had come to buy bonds? That statement was the uncolored fact of the decade and it fell on ears which preferred the dulcet murmurings of the Lorelei of the stock ticker.

One consequence of disseminating colored facts is a crop of wishful thinkers, naïve optimists and pious hopers who have no appetite for a stark realistic picture of the business situation. Perhaps that is why Washington tried to dose us with non-soothing political syrup of the "basically sound" brand. Right now the theme song of the daily press business section is the rediscount rate. Much episodic and colorful writing on this topic fills columns but contains no nourishment. A British banker in one sentence took all the newspaper varnish and color off this fact when he said, "I don't believe that bank rates eat wheat."

Another bedaubed fact with which the papers just flirt is the American living standard. We have been the Joneses in the international family group. Other nations

have been trying to keep up with us, but suddenly they stop chasing us and the Joneses are worried.

During this period of self-determination, as expressed in high tariffs, restricted immigration, food embargoes, wheat and cotton stabilization and other political jockeying, nations become so many Robinson Crusoes. This aggressive insularity is harder on the Joneses than anyone else. If we tell the rest of the world to go stew in its own juice, it will return the compliment.

Perhaps some undoctored facts about significant world happenings might stop some of the neighborhood quarrels. The economic aspects of Mahatma Gandhi's campaign should give us pause in our dream of rapidly Americanizing the world. We see the awakening of a pioneer spirit in Russia, where a modern Sparta is raising a crop of State-reared and trained children to confuse our learned economists and omniscient politicians. The ambitions of such self-appointed and anointed leaders as Stalin, Mustapha Kemal Pasha, Mussolini and the various successors of Sun Yat Sen are as yet unappraisable factors in world business. The world dearly loves a spellbinder, and the activities of a Bryan or a Hitler touch the American pocketbook faster than the rulings of the Federal Reserve Board. As the almanac might say, "About this time look for the appearance of political Pied Pipers."

For centuries business men have been badgered and hectorated by their political overlords, but they have always continued to do business. Even during the bloody struggle between Spain and Holland, commerce was carried on between the two nations. We shall continue to do business, but how much, how soon and on what basis will depend on our ability to see the facts and not dodge them when we see them, and to refuse all substitutes in the form of economic legerdemain and political "flub-dub." There is no profit in fighting conditions. The question is one of adjustment.

GEORGE ROEMER WOODS.

Upward Trend of Output and Demand Is Unchecked

THE upward trend of iron and steel demand has not been checked, although the rate of gain is still gradual. Business from the automobile industry has shown further improvement, specifications for line pipe, tin plate and track materials continue to increase, and releases from miscellaneous consuming lines are in larger volume. Caution remains the dominating note with most buyers and current orders are notable for their greater frequency rather than for their size.

Distribution of tonnage is uneven both as to products and mills and there are wide divergences in the operations of different companies and of different departments in the same organization. But raw steel requirements continue to expand in the aggregate. Ingot output in the Valleys has increased from 50 to 55 per cent of capacity and there have been smaller gains at Chicago, Cleveland and Birmingham. Steel ingot production for the country at large is estimated at 52 per cent, compared with 51 per cent a week ago.

PURCHASES of steel by the automobile industry are the largest since last September. In most cases the orders—mainly for sheets and strips—are to cover immediate production requirements. Ford assemblies, which totaled 55,000 in January, are expected to reach 75,000 this month and may run as high as 100,000 in March. Other motor car makers are also increasing their schedules.

The same seasonal influences that are apparently stimulating automobile demand are also affecting other steel consuming lines in varying degree. Concomitant with recent pipe line releases close to 200,000 tons of projected work has recently come into the market, not counting 14,000 tons for a Rumanian line on which American mills are figuring. The week's additions to the pending list call for about 50,000 tons and include 35 miles of pipe for the Standard Oil Co. of New Jersey, 85 miles for the Texas Co., 70 miles for the Standard Oil Co. of New York, and lines for the Trojan Engineering Co. and the New York Utilities Co.

GENERAL construction work offers greater promise as the spring months approach. The large amount of structural steel now being figured on, much of it for public works, has been swelled by new inquiries for 30,000 tons. Fresh reinforcing bar projects call for 15,500 tons, and the concrete bar requirements of the 1931 highway program are now estimated at 500,000 tons. The week's fabricated structural steel awards, at 55,000 tons, are the second

ORDERS from Automobile Industry Continue to Increase—Large Pipe Line Inquiries—Scrap Up at Pittsburgh, Off at Detroit and St. Louis

largest this year and include two contracts for Cincinnati railroad terminal work, which alone account for 41,000 tons.

Tin plate production has risen to 75 per cent of capacity, compared with 70 per cent a week ago, and output of rails and track supplies has shown a further slight gain, rail mill operations at Chicago having increased to 53 per cent from a 50 per cent rate.

THE Western Maryland is in the market for 10,000 tons of rails and the Milwaukee will soon inquire for 23,000 tons. Railroad demand for cars is dormant, but the steel industry sees a large new outlet for tonnage in the electrification of the Pennsylvania from Philadelphia to Washington and to Pittsburgh. This program, which will be expedited, involves an expenditure of \$170,000,000 and calls for the building of 240 electric locomotives and the construction of viaducts, overhead transmission towers and railroad stations requiring 200,000 tons of steel.

Ship steel soon to be bought includes 6000 tons for a United States cruiser and 12,000 tons for three vessels to be built for the Eastern Steamship Lines.

PRICE indications are inconclusive. Heavy melting scrap has advanced 25c. a ton at Pittsburgh and is stronger in tone at Chicago, but has declined 50c. at Detroit and 25c. a ton at St. Louis. Increased production of scrap by the motor car industry is a weakening factor at Detroit, while a larger influx of material that is ordinarily exported through Gulf ports has had an unsettling effect at St. Louis.

Finished steel prices are still under pressure, but concessions appear to be diminishing in frequency. On the one hand, evidences of expanding demand have given the mills greater confidence; on the other hand, most current orders are individually too small to give the market a severe test. There is less talk of possible attempts to advance prices for the second quarter.

Copper has been advanced in the past week from 10c. to 10¼c., delivered Connecticut valley. It has risen ¾c. a lb. since Feb. 9.

The Treasury Department has ruled that there has been no dumping of manganese ore from Soviet Russia and has declined to issue an anti-dumping order.

Exports of iron and steel in January, 92,745 tons, were the smallest since August, 1921.

THE IRON AGE composite price for heavy melting scrap has advanced from \$11.08 to \$11.17 a ton, the first rise since Jan. 6. The pig iron and finished steel composites are unchanged at \$15.71 a ton and 2.142c. a lb. respectively.

PITTSBURGH

Automobile Companies' Steel Orders Add Slightly to Mill Operations

PITTSBURGH, Feb. 24.—While the general trend of steel business is upward, the pace is that of the tortoise rather than the hare. As there is still unevenness in the distribution of orders, both as regards products and mills, it is doubtful if ingot output has varied appreciably from that of a week ago, or slightly below 50 per cent of capacity.

The effect of an upswing in automobile production has filtered through to this district to a moderate extent. An independent maker of body sheets, whose operations were almost nil in December and only moderately better last month, has in the past week had sufficient business to warrant an increase to a 50 per cent operation of steel-making units. Improvement in demand for other steel products used in automobile manufacture is at least as good as it was a week ago, and, with some manufacturers, a little better. There continues to be uncertainty, however, as to whether the improvement in motor car output is the beginning of a sustained advance or merely an effort to insure dealers sufficient stocks against the expected increase in orders with the advent of open weather.

Tin plate production continues to rise. Business is reasonably satisfactory in building steel, including shapes, piling and reinforcing bars. Rails and track accessories are taking a sizable amount of steel, and a goodly tonnage is being absorbed in line pipe, which is now being released fairly freely on old orders.

Prices in general appear to be holding rather well, but there is plenty of pressure against them, notably on the part of automobile builders, who seem to think their sources of raw material should shoulder a share of the price reductions on cars. A market of the present character offers little real test of prices because the individual tonnages offered are small as a rule and not tempting to mills having a problem of overhead costs to solve. The steel industry is not different from others in showing no inclination to set up price obstacles in the path of business, but there is no question that the mills regard present prices as too low and would like to secure better returns. Of more importance right now, however, is to see business strongly headed upward.

In the primary materials, the one interesting event is that more consumer interest has brought about higher prices for several grades of scrap, and a generally firmer tone to the market.

Despite the relatively sharp increase

Steel trend continues upward, but the pace is very slow.

* * *

Sheet mills have experienced some gain in business as result of freer buying by automobile companies.

* * *

Tin plate output continues to rise. Outlook in building steel fairly satisfactory.

* * *

Pressure against prices is being exerted, but not much of a test is afforded because of smallness of orders.

* * *

Scrap market is slightly firmer, with a moderate rise in heavy melting steel.

in the demand from the automobile industry, business as a whole is still insufficient to carry the general average of mill operations beyond 45 per cent of capacity. A few mills which have a high rate of engagement are counterbalanced by others which are not doing much better than 40 per cent. Releases by consuming lines other than the motor car industry are notable more for their frequency and the insistence on quick delivery than for their size. Even the call from automobile builders does not denote an abandonment of purchases in strict accord with known requirements. Prices are holding rather well, but it would be an exaggeration to say they are absolutely inflexible. Having reduced their prices, automobile builders are disposed to pass on as much of the burden as possible to their sources of raw material supplies.

Pig Iron

Shipments this month are running ahead of those of January, according to most sellers, but new bookings are scarcely as satisfactory. The larger consumers are covered in most cases and smaller users are placing carload orders intermittently for immediate shipment. In a few instances, foundries serving the railroads have stepped up their operations, but makers of radiators and sanitary ware have not increased their production very much and jobbing foundries are especially inactive. While one seller of pig iron is still quoting \$17, Valley, for foundry iron and \$17.50 for malleable and Bessemer, other interests recognize prices 50c. a ton lower and no orders at the higher figures have

been reported in the last week. Only one merchant furnace in the Pittsburgh and Valley district is active, but an additional stack is expected to go into blast during March.

Prices per gross ton, f.o.b. Valley furnace:
Basic\$16.50
Bessemer 17.00
Gray forge 16.00
No. 2 foundry 16.50
No. 3 foundry 16.00
Malleable 17.00
Low phos., copper free....\$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton f.o.b. Pittsburgh district furnace:

Basic\$17.00
No. 2 foundry 17.00
No. 3 foundry 16.50
Malleable 17.50
Bessemer 17.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel

Shipments of billets, slabs and sheet bars to non-integrated makers of sheets, strips and tin plate are considerably larger than they were during January, and the gain has been most noticeable in the last week or 10 days. No new buying is reported. The price remains nominal at \$30 a ton, Pittsburgh or Youngstown. Sellers of forging billets are still taking small orders at \$36, Pittsburgh, but the figure has not been tested by a tonnage inquiry. Specifications for wire rods have improved slightly. The price is unchanged at \$35, Pittsburgh, and makers have given no intimation of second quarter quotations.

Rails and Track Accessories

Releases for track accessories are showing the seasonal increases expected at this time of the year and are considered satisfactory, considering the general business situation. Makers point out, however, that aggregate tonnage is considerably less than at the same time in 1930. Recent specifications have enabled mills to schedule production at a moderate rate for some time to come. Releases on rail tonnage are not encouraging in this district. The Norfolk & Western has closed against its recent order for 3000 kegs of spikes.

Bolts, Nuts and Rivets

Slightly heavier specifications in the last two weeks have enabled makers in this district to step up operations in a limited way, and the industry is now running at 35 to 40 per cent of capacity. Automobile tonnage is heavier and railroad releases have gained. Prices are unchanged at 73 per cent off list for

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton	Feb. 24, 1931	Feb. 17, 1931	Jan. 27, 1931	Feb. 25, 1930
No. 2 Bly, Philadelphia.....	\$17.75	\$17.75	\$17.75	\$20.75
No. 2, Valley furnace.....	16.50	16.50	17.00	18.50
No. 2, Southern, Cin'd.....	14.19	14.19	14.19	16.62
No. 2, Birmingham.....	13.00	13.00	13.00	15.00
No. 2 foundry, Chicago*.....	17.50	17.50	17.50	20.00
Basic, de'd eastern Pa.....	17.25	17.25	17.25	19.25
Basic, Valley furnace.....	16.50	16.50	17.00	18.50
Valley Bessemer, de'd P'gh.....	18.75	18.75	19.25	20.75
Malleable, Chicago*.....	17.50	17.50	17.50	20.00
Malleable, Valley.....	17.00	17.00	17.50	19.00
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Permanganese, furnace.....	80.00	80.00	80.00	24.00

Rails, Billets, Etc., Per Gross Ton	Feb. 24, 1931	Feb. 17, 1931	Jan. 27, 1931	Feb. 25, 1930
Rails, heavy, at mill.....	\$42.00	\$42.00	\$42.00	\$42.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rolling billets, Pittsburgh.....	30.00	30.00	30.00	32.00
Sheet bars, Pittsburgh.....	30.00	30.00	30.00	32.00
Slabs, Pittsburgh.....	30.00	30.00	30.00	32.00
Piercing billets, Pittsburgh.....	36.00	36.00	36.00	38.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	39.00
Skelp, gr'd. steel, P'gh, 100 lb.....	1.80	1.80	1.80	1.85

Finished Steel, Per Lb. to Large Runners	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.65	1.65	1.65	1.85
Bars, Chicago.....	1.70	1.70	1.75	1.95
Bars, Cleveland.....	1.70	1.70	1.70	1.85
Bars, New York.....	1.98	1.98	1.98	2.19
Tank plates, Pittsburgh.....	1.65	1.65	1.65	1.80
Tank plates, Chicago.....	1.70	1.70	1.75	1.95
Tank plates, New York.....	1.93	1.93	1.93	2.07 1/2
Structural shapes, Pittsburgh.....	1.65	1.65	1.65	1.80
Structural shapes, Chicago.....	1.70	1.70	1.75	1.95
Structural shapes, New York.....	1.90 1/2	1.90 1/2	1.90 1/2	2.04 1/2
Cold-finished bars, Pittsburgh.....	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh.....	1.55	1.55	1.55	1.80
Cold-rolled strips, Pittsburgh.....	2.25	2.25	2.25	2.65

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel, Per Lb. to Large Runners	Cents	Cents	Cents	Cents
Sheet, black, No. 24, P'gh.....	2.35	2.35	2.35	2.60
Sheet, black, No. 24, Chicago.....	2.45	2.45	2.45	2.75
Sheet, black, No. 24, P'gh.....	2.30	2.30	2.30	2.50
Sheet, galv., No. 24, Chicago.....	2.40	2.40	2.40	2.70
Sheet, galv., No. 24, P'gh.....	2.35	2.35	2.35	2.60
Sheet, black, No. 14, P'gh.....	2.05	2.05	2.05	2.30
Sheet, black, No. 14, Chicago.....	2.15	2.15	2.15	2.45
Wire rods, Pittsburgh.....	1.90	1.90	1.90	2.25
Wire rods, Chicago dist. mill.....	1.95	1.95	1.95	2.30
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.40
Plain wire, Chicago dist. mill.....	2.25	2.25	2.25	2.45
Hardest wire, galv., P'gh.....	2.55	2.55	2.55	2.90
Hardest wire, galv., Chicago.....	2.60	2.60	2.60	2.90
Pin plate, 100 lb. box, P'gh.....	\$5.00	\$5.00	\$5.00	\$6.25

Old Material, Per Gross Ton	Feb. 24, 1931	Feb. 17, 1931	Jan. 27, 1931	Feb. 25, 1930
Heavy melting steel, P'gh.....	\$12.00	\$12.75	\$12.00	\$14.50
Heavy melting steel, Phila.....	10.50	10.50	10.50	12.00
Heavy melting steel, Chgo.....	10.00	10.00	10.12 1/2	13.50
Car wheels, Chicago.....	10.50	10.50	10.75	15.00
Car wheels, Philadelphia.....	13.50	13.50	13.50	15.00
No. 1 cast, Pittsburgh.....	12.50	12.50	12.50	14.50
No. 1 cast, Philadelphia.....	11.50	11.50	12.00	15.00
No. 1 cast, Chgo (net ton).....	9.50	9.50	9.50	14.00
No. 1 RR, Phila.....	12.00	12.00	12.00	15.00
No. 1 RR, wrot., Chgo (net).....	8.00	8.00	8.50	12.25

Coke, Connellsville, Per Net Ton at Oven	Feb. 24, 1931	Feb. 17, 1931	Jan. 27, 1931	Feb. 25, 1930
Furnace coke, prompt.....	\$2.50	\$2.50	\$2.50	\$2.60
Poussy coke, prompt.....	3.50	3.50	3.50	3.50

Metals, Per Lb. to Large Runners	Cents	Cents	Cents	Cents
Copper, New York.....	16.37 1/2	16.12 1/2	16.12 1/2	18.12 1/2
Electrolytic copper, refinery.....	16.00	9.75	9.75	17.75
Tin (strait), New York.....	27.12 1/2	26.00	26.00	38.12 1/2
Zinc, East St. Louis.....	4.95	4.00	4.00	5.15
Zinc, New York.....	4.35	4.35	4.35	5.50
Lead, St. Louis.....	4.35	4.30	4.35	6.10
Lead, New York.....	4.60	4.50	4.75	6.25
Antimony (Asia), N. Y.....	7.10	7.10	7.25	9.00

bolts and nuts and \$2.75, Pittsburgh, for large rivets.

Bars, Shapes and Plates

With the exception of bar tonnage going to the automotive industry, specifications for the heavy hot-rolled products have not gained materially in the last week. Demand for structural shapes and reinforcing bars has only held its own, but the increasing volume of large building projects in the offing would indicate a rather sharp upturn as tonnage for these jobs begins to reach the mills. The unusually mild winter has enabled contractors to get farther along with excavating and foundation work than would ordinarily be the case and extensive building operations are expected to get under way on a large scale earlier than usual. Structural and reinforcing steel fabricators have received the plans for the foundation of the new Pittsburgh Federal Building, which will take a large tonnage of shapes, sheet steel piling and reinforcing bars. Government buying of river craft and equipment is

still the feature of the barge market. The Inland Waterways Corp'n. will take bids at Memphis, Tenn., on March 9 for two car floats for use at Cairo, Ill., which will require 1500 tons of plates and shapes. The United States Engineer at Mobile, Ala., has thrown out bids opened recently for three barges because a Pittsburgh district builder and a Chicago firm submitted identical figures.

Demand for alloy steel bars from the automobile industry is considerably better, and other bar mill products going to parts makers and allied industries are moving at a better rate.

Action on second quarter prices is still in abeyance, but makers generally refuse to quote less than 1.65c., Pittsburgh, on future orders. In some cases current orders for plates and shapes have commanded slightly lower figures.

Cold-Finished Steel Bars

Releases this month are running about 10 per cent ahead of those of January with most makers, and one

or two report a much larger gain. In the last few days automotive tonnage has been the outstanding factor, but improvement is also reported in other lines. Makers of automatic screw machines, machine tools and general machinery are sending in significant specifications for the first time in many months, and some cold-finished mills in the Pittsburgh district are benefiting by orders from farm implement makers. Second quarter books have not been opened and few requests for future quotations have been received. While the price of cold-finished material depends largely upon that of hot-rolled bars, it is likely that the present price of 2.10c., Pittsburgh, will be carried into the second quarter, and that efforts will be made to advance the old 2c. price wherever possible.

Tubular Goods

Pipe mill operations in both the Pittsburgh district and the Valleys are being advanced as the result of releases on line pipe orders placed as long as six months ago. Specimen-

THE IRON AGE COMPOSITE PRICES

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
Feb. 21, 1931	\$14.20	\$13.20	\$15.71	\$15.00	\$11.17	\$10.80
One week ago	\$14.20	\$13.20	\$15.71	\$15.00	\$11.21	\$10.80
One month ago	\$14.20	\$13.20	\$15.71	\$15.00	\$11.21	\$10.80
One year ago	\$14.20	\$13.20	\$15.71	\$15.00	\$11.21	\$10.80

Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make up 75 per cent of the United States output.

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

tions for hotweld material have not yet shown much seasonal improvement and lapweld units have comparatively no tonnage to work on. Oil country casing has been moving no better this month than last, but the development of a new field in Texas may lead to heavier tonnage in a short time. Mechanical tubing demand from the automobile industry reflects a moderate gain over that of January, and boiler tubes are moving satisfactorily. None of the line pipe projects mentioned last week has been reported let, although the project of the North Central Gas Co. in Wyoming and Nebraska is very active.

Wire Products

Specifications from the manufacturing trade continue to show improvement, but merchant products are still very dull. Wet weather in various parts of the country is expected to improve demand for fencing and barbed wire from jobbers in agricultural communities, but little change is reported yet. Current quotations are holding in the immediate Pittsburgh district, although shading of the \$1.90 price on nails is reported from the East. Manufacturers' wire apparently is well maintained at 2.20c., Pittsburgh.

Strip Steel

The majority of strip makers in this and nearby districts have had considerably heavier releases in the last week. While most of the increase can be attributed to automobile and parts makers, miscellaneous users are also taking more steel. This is particularly true in the case of makers of builders' hardware, small tools and shovels. For the first time in many months, cold-rolled strip is moving better than hot-rolled with some makers. Demand for corrosion-resisting material has also increased, reflecting the wider use of this product by motor car manufacturers. Hot mills in the Pittsburgh district are now running at fully 50 per cent of capacity, with cold-rolling capacity engaged at about 40 per cent. Prices are generally well maintained at 2.25c., Pittsburgh.

on cold-rolled strip and 1.55c. and 1.65c. on hot-rolled. Reports of shading of hot-rolled prices in the Detroit area cannot be confirmed.

Tin Plate

Several of the independent manufacturers are running full this week and, as a result, operations are nearer 75 per cent than 70 per cent, the approximate rate of a week ago. The leading interest last week operated almost two points higher than the week before. Whether shipments are fully up to the rate of production is a question, although at this season it is not unprecedented for mills to produce to some extent against future requirements.

Coke

Demand for domestic coke is well maintained, but the other grades continue quiet. In scattered cases heavier foundry requirements are reported, but the gains are by no means generally distributed. Furnace coke is also very dull and prices are weak. While leading sellers still quote \$2.50, Connellsville, sales at lower figures are not uncommon. The coal market is quiet and apparently must await the opening of Lake navigation before any marked improvement can be expected.

Old Material

The market here reflects greater interest on the part of consumers, in actual advances on several grades and in a stronger attitude by dealers. One good-sized sale of heavy melting steel has been made to a down river mill at \$13, and that price is perhaps as low as any consumer could now obtain. The inside price of the range quoted is solely a dealers' buying price. Mills are making a strong effort to buy steel scrap as cheaply as they could on a lower engagement of steel-making capacity, but there are some whose needs are too urgent to permit them to wait on price. Sentiment lately has changed sufficiently to give basis to a belief that the Pennsylvania Railroad list, amounting to 50,000 tons, which was withdrawn re-

cently because of unsatisfactory prices, will be sold this time. Bids will be closed March 4.

Machine shop turnings have shown real activity and are sharply higher in price. Mills which ordinarily do not use this grade have been buying on the theory that they would help to cut costs. This, with larger demands from regular users, plus light machine shop operations and production, is responsible for a jump of \$1.75 a ton in the price. Recent quotations, however, were merely dealers' buying prices. Other light grades have advanced in sympathy.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$12.75 to \$13.25
No. 2 heavy melting steel	11.00 to 11.50
Scrap rails	12.50 to 13.00
Compressed sheet steel	12.75 to 13.25
Bundled sheets, sides and ends	12.00 to 12.50
Cast iron car wheels	13.50 to 14.00
Sheet bar crops, ordinary	14.00 to 14.50
Heavy breakable cast	10.50 to 11.00
No. 2 railroad wrought	12.50 to 13.00
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	7.75 to 8.25
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	16.00 to 16.50
Railr. coil and leaf springs	16.00 to 16.50
Roller steel wheels	16.00 to 16.50
Low phos. billet and bloom ends	18.00 to 18.50
Low phos. mill plates	16.00 to 16.50
Low phos. light grades	16.00 to 16.50
Low phos. sheet bar crops	16.50 to 17.00
Heavy steel axle turnings	11.00 to 11.50
Electric Furnace Grades:	
Low phos. punchings	15.00 to 16.00
Heavy steel axle turnings	11.00 to 11.50
Blast Furnace Grades:	
Short shoveling steel turnings	7.75 to 8.25
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Rolling Mill Grades:	
Steel car axles	18.00 to 18.50
Cupola Grades:	
No. 1 cast	12.00 to 12.50
Rails 3 ft. and under	14.00 to 14.50

American Steel Foundries reports for the year ended Dec. 31, 1930, consolidated net income of \$2,801,442, after all charges including depreciation and Federal taxes, compared with \$5,121,487 in the preceding 12 months. The 1930 net is equal, after preferred dividend requirements, to \$2.37 a share on the 993,020 common shares outstanding, against \$4.70 a share in 1929.

CHICAGO

Market Gaining Strength, Though at Less Than Seasonal Rate

CHICAGO, Feb. 24.—A semblance of gaining strength is noticeable in the Chicago iron and steel market, though it is less pronounced than usual at this time of year. Ingot output is now at 50 to 52 per cent of capacity, against 48 to 50 per cent a week ago, and is helped principally by shipments of skelp for line pipe manufacture at Milwaukee, larger releases on railroad rail contracts and increased use of raw steel at sheet and tin plate mills. Cold pig iron stocks at steel plants are being reduced, suggesting the likelihood of the blowing in of another blast furnace or two very soon.

Rail mill schedules have been moved up about three points to 53 per cent of capacity, and at the same time the railroad releases in track supplies have improved the output of those products. Tin plate mills are employing more workmen. Sheet mills are working at a little higher rate.

The railroad equipment market is dull, but steel producers expect that some belated inquiries may yet appear. An encouraging note is a request for bids from the Northern Pacific on 500 steel underframes. Agricultural implement manufacturers notice a slight quickening in demand for their products. Progress of the automobile industry is being closely watched. A favorable factor is that mild weather throughout most of the Middle West may soon bring increasing retail sales of motor cars.

While the demands for steel are variable and increasing at a very slow rate, the approach of the spring season is believed to hold out some hope for further gains.

Use of scrap at steel plants is increasing, and the undertone of the scrap markets appears to be slightly firmer.

Ferroalloys

Specifications from steel mills are growing slowly. Few spot sales have been made since the end of the contracting period.

Pig Iron

It is now quite clear that the average daily rate of shipments in February will be only slightly better than the rate in January. However, releases are beginning to come in for March delivery, and the slow upward trend seems destined to continue in the near future. Some inquiries and orders are developing for the second quarter on the basis of current prices, which are firm at \$17.50 a gross ton, base, local furnaces. Southern iron is quiet in the local market, but reports are reaching here that prices

Ingot production moves slightly higher to a range of 50 to 52 per cent.

Skelp requirements for line pipe manufacture, larger releases of rails and track supplies and increasing sheet and tin plate operations are chief aids.

Farm equipment industry notices a slightly improving demand.

With spring near at hand, further moderate gains in steel business are expected.

Scrap use at steel plants increasing. Undertone of scrap market slightly stronger.

second quarter. The railroads are buying very little.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$44 to \$46; 4-in., \$47 to \$49; Class A and gas pipe, \$3 extra.

Rails and Track Supplies

Railroads are now willing to take deliveries of rails and track supplies according to definite schedules, which have forced Chicago rail mills to increase output about three points to 53 per cent of capacity. It is reported that the Milwaukee Road, which has not yet contracted for 1931 requirements, will soon enter the market for about 23,000 tons of rails. Specifications for track supplies at 5000 tons, most of which is for nearby delivery, have made necessary a slight increase in production.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bessemer rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c; track bolts with square nuts, 2.80c; steel tie plates, 1.95c; angle bars, 2.75c.

Reinforcing Bars

In the past week or two small awards have been more frequent. Prospective spring work is piling up, and it appears to be only a question of time before shops will benefit by heavier tonnages. However, the time is near at hand when heavy outdoor work should normally be under way, and yet fabricators' books remain light. Road contractors continue to place bar requirements. Shipments will soon start for the Ogden Avenue, Chicago, development, and there is some talk that the contracts for the Chicago post office will be let in the late spring.

Sheets

Orders have been gradually growing for the past week or 10 days, now affording the best operating conditions in three or four months. Backlogs, as represented by quarterly contracts, are not large, and little of the new buying is for future use, although some consumers are beginning to study the market from that angle. Most orders are for immediate release and therefore are entered promptly at mills. It is of interest that an impressive part of the tonnage entered from day to day comes to sellers by long distance telephone and telegraph, indicating again that users are holding close to the line in the matter of inventories. Output is in the range from 55 to 60 per cent of capacity. The Inland Steel Co. is operating its Indiana Harbor mills at near capacity, but has not yet found it necessary to start its units at Milwaukee. Sheet business in the Southwest is

are firming in the South. Quotations here range from \$10.50 to \$11 a ton. Birmingham. The price structure of silvery is again unsettled, with occasional small tonnages moving at about \$1 under published quotations.

Prices per gross ton at Chicago	
N'th'n No. 2 fdy., sil. 1.75	\$17.50
to 2.25	18.00
N'th'n No. 1 fdy., sil. 2.25	17.50
to 2.75	17.50
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil.	17.50
1.50	17.51
S'th'n No. 2 fdy., sil.	17.51
Low phos., sil. 1 to 2 cop-	
per free	\$28.50 to 29.25
Silvery, sil. 8 per cent	26.75
Bessemer, 14-15 per cent	35.75

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Cast Iron Pipe

Outstanding in recent news is that Chicago is in the market for 16,000 tons of large pipe ranging from 30 to 48-in. in diameter. The impression here is that this is the forerunner of other large purchases for improvement of the Chicago water service. It now seems fairly well established that no further action will be taken by the Sanitary District trustees before election. It is reported that St. Louis has placed orders for 35,000 ft. of 6 and 8-in. pipe. Kenosha and Whitefish Bay, Wis., have contracted for 1000 tons. Utilities, as is their custom, are entering liberal specifications against first quarter contracts and are now studying needs for the

sluggish, but in the Missouri River Valley and territory lying close to Chicago there is a broadening demand from jobbers and the manufacturing trade. Culvert manufacturers have been taking larger quantities, but in view of the size of road programs this industry can still make much improvement.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.50c. to 2.60c.; No. 24 galv., 3.05c. to 3.15c.; No. 10 blue ann'd, 2.95c. to 3.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Hot-Rolled Strip

Automobile frame manufacturers are getting heavier releases and they are hurrying into the market with specifications and new orders. A single order is for 5000 tons, the largest in many months, and shipment is wanted promptly.

Bolts, Nuts and Rivets

Demand for these commodities is steady, but still characterized by small and rather frequent releases. Weakness in prices that has cropped out here and there is making jobbers cautious in entering commitments. A slight growth in specifications is reported from agricultural implement manufacturers, who are forwarding more machinery to dealers.

Structural Material

Structural steel developments are principally in State highway work. Minnesota is in the market for 900 tons for bridges, and it is reported that additional work of this kind is soon to come up in Illinois. Word has been received that the War Department is preparing a design for a steel dam to be placed across the Mississippi River near Rock Island, Illinois. Local shops are estimated to be producing at between 25 and 35 per cent of capacity.

Wire Products

Orders are numerous, though individually small. This can be construed as a reflection of the breadth of use of wire and wire products. Shipments thus far in February are ahead of those of January, but 1931 is running behind the early part of 1930. Although demand is pointing upward, it seems unlikely, according to sellers, that use this year will catch up with shipments last year until sometime in May or even June. Reinforcing mesh is moving slowly, but inquiry is brisk and the outlook is satisfactory. Open winter weather has been favorable to early road grading operations, and concrete laying on a large scale seems to be near at hand. Thought is being given to opening second quarter books early in the first week of March.

Plates

The local plate market is without feature. Tank orders are scarce and fabricators, who are operating at re-

duced schedules, have little at hand on which to figure. In fact, there is considerable speculation in local circles as to the effect that pipe lines are having and will have in future on the capacity of storage tanks that will be used at oil producing centers. The railroad car market gives no indication of coming out of its slump. Line pipe output remains fairly steady, and is taking more of the plate mill output than is any other Midwestern industry.

Bars

Demand for mild steel bars continues to grow, and the diversity of orders is encouraging to sellers. Automobile manufacturers are by far the largest group of users. Output at agricultural implement plants is spotty, gains made at one point usually being offset by losses in other directions. The price structure for mild steel bars is well established at 1.70c. to 1.75c. a lb., Chicago. Use of alloy steel bars continues to gain headway, and production is slowly creeping forward. Supplies of raw steel are dwindling as finishing departments continue to operate above the open-hearth rate of production. The Illinois Steel Co. is trying out its new 8-in. mill and will have it on a commercial basis in a very short time. The iron bar market is without feature. Consumers of rail steel bars are making heavier drafts against mills and inquiries point to a still more active market. Prices are well established at 1.60c. to 1.65c. a lb., Chicago district mills.

Coke

The rate of shipments of by-product foundry coke has been practically stationary since the middle of February. Spot business is dull, with current offerings at \$8 a ton, local ovens.

Old Material

The long-expected improvement in acceptances of heavy melting steel by

important producers is at hand with the announcement this week that shipments to some mills will be doubled. Ingot output has been expanding more rapidly than blast furnace production, and for some time there has been talk in the scrap trade that the meager scrap acceptances were resulting in lower stock piles at consuming points. It is true that there was also an accumulation of cold pig iron, which now seems to have been cut down measurably, and it is not at all unlikely that another blast furnace or two will soon be lighted. Brokers take the position that low prices for scrap and the relative inactivity of producers have worked against the accumulation of large quantities of scrap, and some of them foresee a shortage if demand turns sharply upward. A few sales have been made at prices that indicate a slightly firmer market. About 1000 tons of brake shoes has been taken at an advance of 50c. a ton.

Prices deliv'd Chicago district consumers—Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$9.75 to \$10.25
Shoveling steel.....	9.75 to 10.25
Forgs, switches and guards, cut apart, and misc. rails.....	9.75 to 10.25
Factory hyd. comp. sheets.....	8.25 to 8.75
Drop forge flashings.....	6.75 to 7.25
No. 1 busheling.....	7.00 to 7.50
Forg'd cast and rtd steel carwheels.....	13.00 to 13.50
Railroad tires, chrg. box size.....	13.00 to 13.50
Railroad leaf springs cut apart.....	13.00 to 13.50
Axle turnings.....	8.50 to 9.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles.....	12.00 to 12.50
Coil springs.....	13.25 to 13.75
Electric Furnace Grades:	
Axle turnings.....	9.50 to 10.00
Low phos. punchings.....	11.50 to 12.00
Low phos. plates, 12 in. and under.....	11.25 to 11.75
Blast Furnace Grades:	
Cast iron borings.....	4.75 to 5.00
Short shoveling turnings.....	4.50 to 5.00
Machine shop turnings.....	4.25 to 4.75
Rolling Mill Grades:	
Iron rails.....	11.00 to 11.50
Rerolling rails.....	12.00 to 12.50
Cupola Grades:	
Steel rails, less than 3 ft.....	11.50 to 12.00
Steel rails, less than 2 ft.....	12.50 to 13.00
Angle bars, steel.....	11.00 to 11.50
Cast iron carwheels.....	10.50 to 11.00
Malleable Grades:	
Railroad.....	11.75 to 12.25
Agricultural.....	10.75 to 11.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.....	19.00 to 21.00
*Relaying rails, 65 lb. and heavier.....	22.00 to 27.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars.....	10.00 to 10.50
Iron arch bars, and transoms.....	11.00 to 11.50
Iron car axles.....	17.00 to 18.00
Steel car axles.....	12.00 to 12.50
No. 1 railroad wrought.....	8.00 to 8.50
No. 2 railroad wrought.....	8.50 to 9.00
No. 1 busheling.....	6.00 to 6.50
No. 2 busheling.....	4.00 to 4.50
Locomotive tires, smooth.....	11.50 to 12.00
Pipes and flues.....	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast.....	9.50 to 10.00
No. 1 railroad cast.....	8.50 to 9.00
No. 1 agricultural cast.....	8.00 to 8.50
Stove plate.....	7.25 to 7.75
Grate bars.....	7.00 to 7.50
Brake shoes.....	7.75 to 8.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	2.00c.
Soft steel bars.....	2.90c.
Reinforcing bars, billet steel.....	2.00c.
Rail steel reinforcement.....	1.50c. to 1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.35c.
Flats and squares.....	3.85c.
Bands 2 in. (in Nos. 10 and 12 gages).....	3.10c.
Hoops (No. 14 gage and lighter).....	3.65c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Blue ann'd sheets (No. 10).....	3.35c.
Spikes (2 in. and larger).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
Per Cent Off List	
Machine bolts.....	60 and 10
Carriage bolts.....	60 and 10
Cow and lag screws.....	60 and 10
Hot-pressed nuts, sq., tap, or blank.....	60 and 10
Hot-pressed nuts, hex., tap, or blank.....	60 and 10
No. 8 black ann'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

CLEVELAND

Steel Business Still Follows Slightly Upward Course—Ingot Output Higher

CLEVELAND, Feb. 24.—Demand for finished steel is still on the uptrend, as is shown by a slight gain in the past week. The total volume of business taken in February will show quite an increase over that of January. The market has broadened and, while orders are still small, they are coming from more diversified sources. Some plants in the metal-working field that have been inactive are beginning to show a little life.

Considerable new business in sheets and strip steel came from the motor car industry the past week and enabled some of the Ohio mills to increase operations. However, there is still considerable irregularity in operating schedules of these mills.

A Cleveland mill put on an additional open-hearth furnace this week, and local plants are now operating at 53 per cent of capacity. Black and full finished sheet mills are operating at about 45 per cent, jobbing mills at 40 per cent, hot strip mills at 50 per cent and cold strip mills at 40 per cent. These figures represent a slight gain over two weeks ago.

Awards of nearly 40,000 tons in structural steel were made in Cincinnati during the week for the Union Terminal project, including a passenger station. Bids for 11,000 tons for hangars for the Air Corps, Dayton, Ohio, will be taken by the War Department Feb. 27.

Ohio opened bids today for the building of a number of highways, the first in its 1931 program. A large amount of highway construction work will be started with the opening of spring and some estimates are that as much as 300,000 tons of reinforcing steel will be used in road building in this country this year.

Pig Iron

While sales were light the past week, some furnaces report a slight gain in inquiry. Two lots of 1000 tons each are pending. More interest is being shown in second quarter, and some additional business has been taken for that delivery at current prices. Additional releases have come out, mostly from the motor car industry, and February shipments will show a moderate gain over those of January. The 50c. price reduction openly named in the Valley district has had no effect on Lake furnace prices. Recently Valley furnaces had named \$16.50 on foundry iron for shipment to some points in competition with Lake furnaces. Foundry and malleable iron are quoted by Lake furnaces at a minimum of \$16 for Ohio and northern Indiana delivery. The price for delivery in Cleve-

land and for shipment to Michigan is \$17.50.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25.....	\$17.50
S'th'n fdy., sil. 1.75 to 2.25.....	\$16.51 to 17.01
Malleable	17.50
Ohio silvery, 8 per cent.....	25.00
Stand. low phos., Valley.....	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Iron Ore

Consumption of Lake Superior ore showed a slight uptrend during January. During that month, 2,349,522 tons was consumed, a gain of 10,698 tons over December. This compares with 4,101,015 tons in January, 1930. Furnace stocks Feb. 1 amounted to 30,430,417 tons. The amount at furnaces and Lake Erie docks on that date was 36,619,938 tons, compared with 33,528,398 tons on the same date a year ago. Central district furnaces consumed 1,091,015 tons in January, a gain of 31,937 tons. Lake front furnaces used 1,197,021 tons, a gain of 2720 tons. Eastern furnaces consumed 14,739 tons, a decrease of 5925 tons, and all-rail furnaces used 46,747 tons, a loss of 18,034 tons. There were 90 furnaces in blast using Lake ore Jan. 31, an increase of six for the month.

Sheets

Orders from the Michigan territory, largely for auto body sheets, took a spurt the past week, but business in the immediate Cleveland territory was slower than during the week or two preceding. Orders for the most part are small. Prices generally are firm, although jobbers occasionally are able to secure a concession of \$1 or \$2 a ton from the 2.90c. price on galvanized sheets. Quite a few second quarter inquiries have come out. While there is little expectation of a price advance, mills are withholding quotations for the coming quarter.

Strip Steel

Some further improvement is reported in the demand for hot-rolled strip. However, there is not much activity outside of the motor car industry. Cold-rolled material is moving slightly better than a few weeks ago. Manufacturers feel that hot-rolled strip prices should be advanced for the second quarter, but express little hope of putting an advance in effect. Prices are firm at 1.55c., Pittsburgh, for wide strip, 1.65c. for narrow and 2.25c., Cleveland, for cold-rolled strip.

Bars, Plates and Shapes

Demand for steel bars continues to

expand and is more diversified than recently. Plate orders have gained from manufacturers of small tanks. Detroit has placed a water pipe line, requiring 1275 tons, with a western New York fabricator. Little new building work is out for figures in this territory. Prices are unchanged at 1.65c. to 1.70c., Cleveland, for steel bars. While 1.65c., Pittsburgh, is the ruling quotation on plates and shapes, the 1.60c. price has not entirely disappeared on new business. Most consumers are under contract at that price.

Wire Products

Reports of shading on manufacturers' wire \$2 a ton to 2.10c., Cleveland, have become more common, although for Cleveland delivery the regular price appears to be maintained. Concessions to \$1.85 a keg on nails are being made to some jobbers.

Fluorspar

While a sale at \$14 has been reported in Pittsburgh, \$14.50 seems to be the lowest quotation now in evidence. One contract for 3000 tons has been closed at \$15.

Old Material

A Cleveland mill, which held up all shipments for several weeks, has released restricted shipping orders for blast furnace grades. Valley district mills are taking scrap a little more freely, and that has led to some buying by dealers, who are paying \$12 for No. 1 heavy melting steel, \$10.50 for No. 2 and \$11 to \$11.50 for compressed sheet steel, delivered Valley mills. There is no activity locally.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$10.00 to \$10.50
No. 2 heavy melting steel.....	9.75 to 10.00
Compressed sheet steel.....	9.25 to 9.50
Light bundled sheet	
stampings	7.50 to 7.75
Drop forge flashings.....	8.00 to 8.50
Machine shop turnings.....	4.75 to 5.25
Short shoveling turnings.....	7.00 to 7.25
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	10.00 to 10.50
No. 1 busheling.....	8.50 to 9.00
Pipes and flues.....	5.50 to 6.00
Steel axle turnings.....	9.50 to 10.00
Acid Open-Hearth Grades:	
Low phos., billet bloom	
and slab crops.....	16.50 to 17.00
Blast Furnace Grades:	
Cast iron borings.....	7.00 to 7.50
Mixed borings and short	
turnings	7.00 to 7.50
No. 2 busheling.....	6.25 to 6.50
Cupola Grades:	
No. 1 cast.....	12.00 to 12.50
Railroad grate bars.....	6.00 to 6.50
Stove plate	6.00 to 6.50
Rails under 3 ft.....	15.00 to 15.50
Miscellaneous:	
Rails for rolling.....	15.00 to 15.50
Railroad malleable	12.50 to 13.00

NEW YORK

Pipe Line Projects Feature Steel Demand— Pig Iron Sales 6000 Tons

NEW YORK, Feb. 24.—Pig iron demand shows little change in volume, although inquiry is becoming more diversified. Sales, at 6000 tons, compare with 9000 tons in the previous week and 5500 tons two weeks ago. Shipments are showing gradual improvement. Prospective castings business is giving more definite promise of materializing. The General Fire Extinguisher Co., Providence, R. I., is in the market for 1000 tons of No. 2X and No. 1X for delivery through the second quarter and into the third. A Connecticut melter is inquiring for 1500 tons of foundry for fairly prompt shipment. Other pending business totals about 2000 tons, including 250 tons of foundry wanted by the Westinghouse Electric & Mfg. Co. for its Springfield, Mass., plant. Competition remains keen, although no new significant changes in prices are reported.

Prices per gross ton, delivered New York district.

Buffalo No. 2 fdy., sil.	1.75 to 2.25	\$19.91 to \$20.41
*Buff. No. 2, del'd cost.		
N. J.		18.28 to 18.78
East. Pa. No. 2 fdy., sil.	1.75 to 2.25	17.39 to 18.39
East. Pa. No. 2X fdy., sil.	2.25 to 2.75	17.89 to 18.89

Freight rates: \$4.01 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Finished Steel

Specifications for finished steel products coming to district offices in the New York area are holding their own, and improvement is reported in bars and strip steel. New business is very sluggish, although prospective tonnage is encouraging, particularly in line pipe. Several projects now being figured by local offices will require approximately 50,000 tons of pipe. Included are 35 miles of 8½-in. pipe for the Standard Oil Co. of New Jersey, 85 miles of 6-in. and other sizes for the Texas Co., 70 miles of 10-in. for the Standard Oil Co. of New York and substantial tonnages for the Trojan Engineering Co. and the New York Utilities Co., on which estimates are being prepared. Steel company export offices are also devoting considerable attention to an oil line in Southeastern Europe and Asia Minor, which may eventually take as much as 1250 miles of pipe. This is the largest project of its kind ever considered for Europe and may be a forerunner of considerable pipe business abroad.

Fabricated structural awards have been rather light, the only outstanding job being an apartment and church building in Manhattan, which calls for 2000 tons. Little new business has come out recently, although the volume of pending work is rather large.

Plates are very quiet, but specifications for bars are increasing. Sheets have failed to show any material gain, but releases of strip steel, both hot and cold-rolled, have been considerably heavier. This gain in tonnage is also reflected in continuous mill sheets.

In the absence of sizable new buying, prices are fairly well maintained except on nails and galvanized sheets. The latter are more easily obtainable in the New York district at 2.85c., Pittsburgh, although this price seems to be confined to jobbers. Nails are being sold in many cases at \$1.85 a keg, Pittsburgh, as compared with a recent minimum of \$1.90. District offices have been given little intimation of second quarter prices, but consumers are not seeking quotations in many cases. An advance on heavy hot-rolled products for second quarter is still expected in some quarters.

Warehouse Business

Buying continues in about the same volume as in January, but total business is smaller than usual at this season. Demand for structural steel is light, but prices are fairly well maintained. Sheet quotations have been slightly firmer in the past week, but concessions on galvanized still appear occasionally.

Cast Iron Pipe

Inquiry for gas and water pipe is accumulating as plans mature for

spring work by municipalities and utilities. The Department of Purchase, New York, is about to close on 3300 tons of pipe for the Bronx and a substantial tonnage of fittings. Early in March, the Department of Sanitation, New York, is expected to be in the market for 3000 to 4000 tons of cast iron pipe. A gas company which buys in this district is inquiring for about 1000 tons of pipe for Northeastern delivery. Among pipe makers in the United States, the low bidder for 3500 tons of water pipe inquired for by Manila, P. I., was the American Cast Iron Pipe Co., Birmingham. Cast iron pipe prices are generally unchanged, Northern foundries maintaining \$35 a net ton, except for occasional concessions on large lots.

Prices per net ton delivered New York:
Water pipe, 6-in. and larger, \$37.90 to \$38.90; 4-in. and 5-in., \$40.90 to \$41.90; 3-in., \$47.90 to \$48.90. Class A and gas pipe, \$5 extra.

Reinforcing Bars

Foundations for the municipal incinerator plant on Ward's Island, on which bids will be asked shortly, will take about 6500 tons of reinforcing bars. Specific inquiry during the last week has been light, but pending work, increased by extensive road building programs in northern New Jersey, is rather substantial. Prices are unchanged.

Old Material

No transactions of importance are reported. Barges continue to be loaded with No. 1 heavy melting steel for delivery to Bridgeport, Conn., at \$7.50 a ton, on barge, and brokers who are filling eastern Pennsylvania contracts paying \$6.75 to \$7 a ton, New York, or \$10.25 to \$10.50 a ton, delivered eastern Pennsylvania, for No. 1 steel. Other grades of scrap are inactive.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$6.75 to \$7.50
Heavy melting steel (yard)	5.00 to 5.25
No. 1 hvy. breakable cast	6.75 to 7.25
Stove plate (steel works)	4.75 to 5.00
Locomotive grate bars	4.75 to 5.00
Machine shop turnings	3.50
Short shoveling turnings	3.50
Cast borings (blast fur. or steel works)	3.50
Mixed borings and turnings	3.00
Steel car axles	14.00
Iron car axles	17.50 to 18.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.25
Forge fire	7.00
No. 1 railroad wrought	8.75
No. 1 yard wrought, long	7.75
Rails for rolling	9.25 to 9.75
Stove plate (foundry)	5.50 to 6.00
Malleable cast (railroad)	9.50 to 10.00
Cast borings (chemical)	8.50 to 9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	\$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size	10.50
No. 2 cast (radiators, cast boilers, etc.)	10.00

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.50c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Rails	3.40c.
Blue anne'd sheets (No. 10)	3.00c. to 3.25c.
Black sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terme sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, calv. annealed	5.15c.
Tire steel, ½ x ¾ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¾ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.
No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.	
Machine bolts, cut thread:	Per Cent Off List
¾ x 6 in. and smaller	.65 to .65 and 10
1 x 30 in. and smaller	.65 to .65 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller	.65 to .65 and 10
¾ x 20 in. and smaller	.65 to .65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

PHILADELPHIA

Sheet Orders Increasing— Steel Prices Maintained

PHILADELPHIA, Feb. 24.—Operating rates of eastern Pennsylvania mills are unchanged at about 40 per cent, except the leading independent interest in this district, which is maintaining 54 per cent, and is planning a further increase in open-hearth output before the end of the quarter, based on a larger volume of new business. Sheet mills especially have experienced marked improvement, and have been able in certain instances to operate up to 70 per cent of capacity. Except for occasional concessions of \$1 a ton to the larger buyers of galvanized sheets, sheet prices are being maintained, and one mill has reaffirmed the current level of prices for second quarter.

Substantial fabricated steel contracts are in prospect, including a subway extension on Market Street, Philadelphia, on which bids are being taken; a building for the Department of Justice in Washington, and a Post Office at West Philadelphia, for which plans are being prepared.

The Baldwin Locomotive Works booked orders for 10 locomotives last week, five for the Western Pacific Railroad and five for the Soviet Union.

Pig Iron

Although foundries continue to show minor increases in operations, based on new contracts for castings, pig iron requirements are still limited and buying seldom exceeds one or two carloads of iron for prompt shipment. The Washington Navy Yard, which is in the market for 225 tons of low phosphorus pig iron, has added 50 tons of charcoal iron to its inquiry. Birmingham furnaces are reported to have made substantial reductions in stocks on yards, and furnace operations are greatly restricted. Southern iron prices, however, continue at \$10.50 to \$11 a ton, furnace. Eastern Pennsylvania producers quote \$17 to \$17.50 a ton, base, on foundry iron. Basic iron is unchanged in price and further buying by consumers is not expected for some weeks.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$17.76 to \$18.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	18.26 to 18.76
East. Pa. No. 1X, 1.75 to 2.25 sil.	18.76 to 19.26
Basic (del'd east. Pa.)	17.25 to 17.50
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Steel Bars

Prices are unchanged at 1.60c. to

1.65c., Pittsburgh, or 1.89c. to 1.94c., Philadelphia, the higher quotation being for less-carload lots and miscellaneous specifications. Reinforcing bars are quoted at 1.65c. to 1.70c., Pittsburgh, or 1.94c. to 1.99c., Philadelphia, for billet steel bars, and 1.50c., Franklin, Pa., or 1.79c., Philadelphia, for rail steel bars. The number of reinforced concrete projects in the market has not materially increased, but individual tonnages of bars required are larger. A court house in Camden, N. J., calls for 150 tons, a sewer in Pottstown, Pa., 150 tons, and footings for the Department of Justice Building in Washington about 100 tons of bars.

Shapes

Fabricating shops are bidding on some substantial tonnages of structural steel, including about 11,000 tons in aircraft hangars for the United States Army, bids on which will be opened Feb. 27. Shape prices on recent business have shown a range of about \$2 a ton, most tonnages going at 1.70c. a lb., f.o.b. mill, or 1.76c., Philadelphia, for medium-sized orders and 1.75c., mill, or 1.81c., Philadelphia, for small, miscellaneous specifications. On large, highly desirable contracts, and when buyers have protections for the current quarter at a lower price, 1.70c., mill, has been occasionally shaded \$1 a ton.

Plates

Mill operations are unchanged. Prices are maintained at 1.70c., Coatesville, Pa., or 1.80½c., Philadelphia, for medium-sized tonnages, with 1.75c., Coatesville, or 1.85½c., Philadelphia, applying on miscellaneous specifications of less than a carload. Locomotives booked in the past week by the local builder represent about 500 tons of quality steel plates, and

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq. twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats.	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¾-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.15c.
Light plates, blue annealed (No. 10)	3.95c.
Blue ann'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 40 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

about 4600 tons of ship plates will be closed this week by a shipbuilder in this district for Eastern Steamship Co. liners.

Sheets

In general, sheet mills are enabled to operate at higher rates than other steel producers, aided largely by tonnage from the automobile industry. Prices are firm, except for occasional concessions of \$1 a ton on galvanized sheets quoted to large users and jobbers. Galvanized are quoted at 2.90c., a lb., Pittsburgh, or 3.19c., Philadelphia, and black sheets at 2.35c., Pittsburgh, or 2.64c., Philadelphia. Blue annealed sheets, No. 13 gage, are 2.05c., Pittsburgh, or 2.34c., Philadelphia, and blue annealed plates, No. 10 gage, are 1.90c., Pittsburgh, or 2.19c., Philadelphia, except when competition is encountered from the product of the continuous mill, when concessions are granted.

Imports

In the week ended Feb. 21, steel arrivals at this port consisted of 34 tons of bearing billets, 32 tons of bearing tubes, 20 tons of cold-drawn steel rods and 6 tons of bearing bars from Sweden, and 22 tons of structural shapes from Belgium.

Old Material

Transactions in all grades of scrap have been limited to small tonnages in the past week. A Coatesville, Pa., consumer of No. 1 heavy melting steel is reported to have closed on a small order, but otherwise the market is quiet.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$10.00 to \$11.00
No. 2 heavy melting steel	9.00
Heavy melting steel (yard)	8.50
No. 1 railroad wrought	11.50 to 12.00
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	9.00 to 10.00
Hydraulic compressed, old	8.00 to 8.50
Machine shop turnings (for steel works)	6.50 to 7.50
Heavy axle turnings (for equiv.)	9.50 to 10.00
Cast borings (for steel works and roll. mill)	7.50
Heavy breakable cast (for steel works)	11.00
Railroad grate bars	9.00
Stove plate (for steel works)	9.00
No. 1 low phos. hvy., 0.04% and under	17.00 to 18.00
Couplers and knuckles	15.50 to 16.00
Roller steel wheels	15.50 to 16.00
No. 1 blast furnace scrap	6.50 to 7.00
Wrot. iron and soft steel pipes and tubes (new specifi.)	11.50 to 12.00
Shafting	18.00
Steel axles	17.50 to 18.00
No. 1 forge fire	11.00
Cast iron carwheels	13.50 to 14.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	12.50 to 13.00

ST. LOUIS

Demand for Malleable Pig Iron Better—Steel Business Slightly Improved

ST. LOUIS, Feb. 24.—A bright spot in an otherwise dull pig iron market is the pickup in the melt of malleable, especially among plants that cater to the automobile trade, resulting in some increase in the buying of raw materials. The St. Louis Gas & Coke Corp., has sold 1000 tons of malleable to a melter, and other small sales were made. That maker's shipments are slightly better, and the outlook is that the movement during February will equal that of January, despite the shorter month. The market continues firm.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, fob.	
Granite City, Ill.	\$17.50
Malleable, fob. Granite City	17.50
N'th'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	14.92
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: The (average) Granite City to St. Louis, \$2.10 from Chicago, \$4.12 from Birmingham.

Finished Steel

New business and shipments of the Granite City Steel Co. for the first half of February were greater than for the corresponding period in January. The demand for galvanized sheets continues limited, and the volume of tank plates is only fair, although the demand is steady and somewhat better than it was two weeks ago. Because of miscellaneous requirements, the demand for blue annealed sheets is greatly improved. There also was a noticeable improvement in the demand for tin plate for the first two weeks of February over the preceding period, and a continued good demand for this product is expected for several months. The structural steel fabricating trade is exceedingly dull, with no sizable projects in sight, and plants in the district are said to be operating at 15 to 20 per cent of capacity.

Warehouse Prices, f.o.b. St. Louis

	Base per lb.
Plates and strips, shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw	
stock	5.60c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.60c.
Blue ann'd sheets (No. 40)	3.45c.
Black corrug. sheets (No. 24)	4.10c.
Galv. corrug. sheets	4.70c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
	Per Cent Off List
Tank rivets, 5/16-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

Old Material

The scrap market continues weak, and lower prices have been made by dealers on a number of items, because of a lack of buying by mills in the district, which give no indication as to when they again will be in the mood to buy sizable tonnages. Dealers have been buying distress cars to fill contracts, and a small amount is being laid down in yards. With the export market shut off, dealers in the Southwest are looking to St. Louis for business. One Texas dealer realized \$3.50 a ton for material shipped here after paying freight charges. No. 1 and No. 2 heavy melting or shoveling steel, miscellaneous rails, No. 2 railroad wrought, rails for rolling, cast iron car wheels, and No. 1 machinery cast are 25c. lower, while iron rails are \$1.50 less and machine shop turnings 50c. off.

Railroad lists: Union Pacific, 1500 tons; International Great Northern, 190 tons; New York, Chicago & St.

Louis, 48 carloads; St. Louis Southwestern, 10 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	\$10.50 to \$11.00
No. 1 heavy melting or shoveling steel	9.00 to 9.50
No. 2 heavy melting or shoveling steel	8.75 to 9.25
No. 1 locomotive tires	10.75 to 11.00
Misc. stand-sec. rails including frogs, switches and guards, cut apart	10.00 to 10.50
Railroad springs	13.00 to 13.50
Bundled sheets	6.50 to 7.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 bushing	6.75 to 7.25
Cast iron borings and shoveling turnings	6.25 to 6.75
Iron rails	8.00 to 8.50
Rails for rolling	10.75 to 11.25
Machine shop turnings	3.50 to 4.00
Heavy turnings	7.00 to 7.50
Steel car axles	14.50 to 15.00
Iron car axles	20.00 to 20.50
Wrot. iron bars and trans.	11.00 to 11.50
No. 1 railroad wrought	10.50 to 11.00
Steel rails, less than 3 ft.	13.00 to 13.50
Steel angle bars	9.50 to 10.00
Cast iron car wheels	9.75 to 10.25
No. 1 machinery cast	9.50 to 10.00
Railroad malleable	10.00 to 10.50
No. 1 railroad cast	9.50 to 10.00
Stove plate	7.50 to 8.00
Relay. rails, 60 lb. and under	16.00 to 16.50
Relay. rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	9.50 to 10.00

YOUNGSTOWN Valley Mills Experience Continued Moderate Gains

YOUNGSTOWN, Feb. 21.—Continued moderate improvement in demand for steel products from Valley mills during the last week now seems to insure an increase in deliveries over January for the present month, even though three less working days are provided. Gains are attributed principally to automobile and parts makers, who have stepped up their releases since the middle of the month, although one steel company is now benefiting considerably from the growing requirements of its pipe units. At the same time, tin plate specifications have shown consistent increases.

Maintenance of demand from small, diversified consumers, coupled with the factors mentioned above, brought open-hearth steel production during the week to the highest level in many months. Furthermore, a substantial gain was in prospect for this week, and independent steel producers will operate their open-hearth capacity at 55 to 60 per cent of potential capacity. With production at Steel Corporation plants slightly lower, the average for the district as a whole will approximate 55 per cent.

Prospective pipe line tonnage is one of the most encouraging factors in the current situation. One large company is figuring on at least 100,000 tons of this material, much of which is expected to be let within the next fortnight. This same company has recently had shipping releases on at least 10,000 tons of 6-in. and 10-in. material placed during the last

two months, and the business has immediately been reflected in higher open-hearth production at a local plant. Another blast furnace may be added in the near future. The other pipe maker is working on a large order for its electric weld mill, which will require several weeks for execution, and is also in a position to benefit materially from the pipe line projects in prospect. Butt-weld pipe production is slightly heavier, but has not yet reacted to the usual spring upturn in demand. Lap-weld capacity is largely idle. Continued light demand for furnace welded pipe is largely responsible for the low rate of Bessemer steel production in the district.

Tin plate leads the flat-rolled products in current demand, with the Warren, Ohio, mills occupied at practical capacity. The Warren mills have also benefited materially from strip orders, and all the open-hearth furnaces at that point are running. Demand generally has improved much more rapidly in the last week or two for strips than for sheets. Automobile parts makers have released considerable tonnage and, while this foreshadows an improvement in sheet demand from the automobile industry, substantial gains will not likely be felt before next month. Full-finished mills in the districts are not running at more than 50 per cent of capacity, while demand for the common finishes hardly justifies this high a rate. Better releases for enameling stocks are reported, reflecting activity among makers of stoves, electric re-

frigerators and other users. Demand for plates continues sluggish, while bars reflect only a moderate gain in tonnage. Reinforcing bars have been somewhat disappointing.

Valley steel makers are unwilling to commit themselves on second quarter prices. While a few requests for quotations for that period on sheets, strips and bars have been received, makers have generally delayed quoting in advance. It is safe to assume that second quarter shipments will not carry prices higher than the present minimum figures, even though higher asking quotations are adopted by leading producers in the next week or two. With present activity con-

fining principally to releases against old orders, no test of current prices is offered and the entire price structure is characterized as reasonably firm.

Local sellers of pig iron are willing to recognize lower prices on pig iron recently announced in the Pittsburgh district, although the decline has had no effect on the market. The natural Valley territory is so restricted by outside competition that only a few buyers are affected. Consumption continues very limited. Sales of heavy melting steel at \$12.50 have been made, with hydraulic compressed sheets selling at the usual differential.

spring and summer. Inquiries are developing earlier than usual, and it is expected that a heavy tonnage will be placed within the next few months. Base quotations are nominally retained at \$37 to \$38, with concessions being made.

Coke

The dullness of the market is unchanged. Foundries are ordering as needed, and shipments on contracts are close to requirements. Quotations continue at \$5. The Ensley plant of the Semet-Solvay Co. took off 30 ovens on Feb. 18, leaving 90 of its 220 in operation. The total number of active ovens in Alabama is 846 of 1390.

Old Material

The mills are not buying, and the foundry demand has almost faded out. Dealers are marking time.

Prices per gross ton delivered Birmingham dist. consumers' yards

Heavy melting steel	\$10.50 to \$11.00
Scrap steel rails	10.50
Short shoveling turnings	9.00
Cast iron borings	8.50
Stove plate	8.50
Steel axles	12.00
Iron axles	18.00
No. 1 railroad wrought	10.00
Rails for rolling	11.50 to 12.00
No. 1 cast	11.00
Tramcar wheels	11.00 to 11.25
Cast iron borings, chem.	13.50
Cast iron carwheels	11.00

BIRMINGHAM Seasonal Steel Demands Felt in Some Lines—Pig Iron Prices Steadier

BIRMINGHAM, Feb. 24.—There was very little activity in pig iron last week. Day to day business is dragging along on a small-lot basis. Shipments on previous commitments are at a fair rate. Quotations for No. 2 foundry, after being unsettled at a range of \$13 to \$13.50, are now more uniform at \$13. Foundries are beginning to build up stocks on this basis, and pipe plant requirements are increasing.

Eleven blast furnaces are in operation, no changes having occurred during the past 10 days. Six are on foundry, three on basic, one on low phosphorus and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$13.00
No. 1 fdy., 2.25 to 2.75 sil.	13.50
Basic	13.00

Finished Steel

February bookings to date, omitting rails, are about on a parity with those of December and January, which were two of the best months since last spring. There were also several good rail orders during those two months, but nothing of importance has been announced thus far in February. Reinforcing bar and structural tonnages are coming in ahead of the usual season, and the outlook is encouraging. Mild weather and rushed highway construction have contributed largely to this situation. Fence business is developing, and sheets are steady. These conditions offset the slack that has been felt in several other lines. Structural steel and reinforcing bar fabricators booked very little business of any size during last week, but are operating at a fair rate on accumulated orders. The Ingalls Iron Works is increasing its plant operations as deliveries begin on several large contracts recently reported.

Active open-hearths number 16, an increase of one. The Tennessee company has seven on at Ensley and six

at Fairfield. Gulf States Steel has three in service at Alabama City.

Cast Iron Pipe

Bookings were unimportant during last week, but the outlook is becoming more encouraging as various cities begin shaping their requirements for

PACIFIC COAST Undertone of Market is Better Even Though Business is Limited

SAN FRANCISCO, Feb. 21 (*By Air Mail*).—Little of real importance transpired this week, although the general undertone of the market has improved and more optimism prevails. Featuring the awards were 2270 tons of cast iron pipe for Los Angeles, placed with R. D. Wood & Co., and 1100 tons of structural shapes for the Times-Mirror Building in Los Angeles, taken by the Consolidated Steel Corpn.

Bars

Most of the reinforcing bar awards were in lots of less than 100 tons. The Soule Steel Co. took 200 tons for a pier in Oakland and the Concrete Engineering Co. booked 300 tons for a school in the same city. Bars for the Times-Mirror Building, Los Angeles, involving 300 tons, were placed with an unnamed interest. Bids are being taken on 300 tons for a dormitory at Westwood, Cal., and bids have been opened on 240 tons for

Pig iron prices per gross ton at San Francisco:

*Utah basic	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25	22.00 to 24.00

*Delivered San Francisco.
**Duty paid, each car San Francisco.

highway work in San Joaquin County, Cal. Prices for reinforcing bars continue to hold at 2.50c., base, on car-load lots, in the Los Angeles and San Francisco districts. Merchant bar steel is not in heavy demand, and quotations are nominal at 2.25c., c.i.f.

Plates

Plate demand has shown little improvement. The only award of importance involved 100 tons of No. 20 gage material for a 30,000-ft. corrugated pipe line for the new Ford plant in Seattle, placed with the Reall Tank & Pipe Co. Bids have been opened on 300 tons for a 24 and 36-in. pipe line in Seattle and on 750 tons for a ferry boat at Coronado. Prices range from 2.05c. to 2.15c., c.i.f.

Shapes

Structural awards were the smallest for any week so far this year, totaling less than 2000 tons. The

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.40c.
Black sheets (No. 24)	4.25c.
Blue ann'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.60c.
Struc. rivets, 1/2-in. and larger	5.60c.
Com. wire nails, base per keg	\$3.25
Cement c'd nails, 100 lb. keg	3.35

McClintic-Marshall Co. booked 200 tons for an apartment house in San Francisco and the Virginia Bridge & Iron Co. secured 315 tons for the Puyallup River bridge near Tacoma. The Consolidated Steel Corp. was low bidder on 250 tons for ring gates at Denver for the Government. Shapes continue to range from 2.15c. to 2.25c. c.l.f.

Cast Iron Pipe

The largest award was secured by R. D. Wood & Co., and 2270 tons of

6 and 8-in. Class B pipe for Los Angeles. The American Cast Iron Pipe Co. took 169 tons of 4 and 6-in. Class B pipe for Puyallup, Wash., and an unnamed maker booked 100 tons of 2 to 8-in. Class 150 pipe for Newport Beach, Cal. More than 7500 tons is now pending. Bids have been opened on 2264 tons of 6 and 20-in. Class B pipe for Long Beach, Cal., and on 2246 tons of 8 and 12-in. pipe for Los Angeles. Redwood City, Cal., will open bids on March 16 for 328 tons of 10 and 14-in. Class B pipe.

BUFFALO Pig Iron Market Sentimentally Better—Steel Operations Unchanged

BUFFALO, Feb. 24. The pig iron market is sentimentally better, notwithstanding few signs of decided improvement. Most of the tonnage placed during the past week was in small lots, but there was one sizable order, regarding which details are withheld. Aside from this order, the business totaled about 3000 tons. Prices for the district hold firm, but in competing in the East the Buffalo furnaces are obliged to shade \$16, furnace. Except for slight gains in the operations of some malleable foundries, the pig iron melt is unchanged.

Prices per gross ton, f.o.b. Buffalo:

No. 2 (dy. sil. 1.75 to 2.25).....	\$17.50
No. 2A (dy. sil. 2.25 to 2.75).....	18.00
No. 1 (dy. sil. 2.75 to 3.25).....	19.00
Malleable, sil. up to 2.25.....	18.00
Basic.....	17.50
Local Superior charcoal.....	27.28

Finished Steel

Mills in this district are operating at about the same rates as a week ago. The Lackawanna plant of Bethlehem Steel Corp. continues to use 18 open-hearth furnaces, with its finishing mills scheduled at about 60 per cent. The Donner plant of Republic Steel Corp. has two open-hearth furnaces in service, and the Wickwire Spencer plant is using the same number. The Gould Coupler Co. is operating one. The Seneca Iron & Steel Co. has its sheet mills scheduled at about 50 per cent.

Structural steel awards have picked up slightly. Among new lettings are

Warehouse Prices, f.o.b. Buffalo

	Base per lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.15c.
Reinforcing bars.....	2.95c.
Cold-rolled flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.60c.
Bands.....	3.50c.
Hoops.....	3.90c.
Blue anne'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.60
Black wire, base per 100 lb.....	3.20

300 tons for a school at Au Sable Forks, N. Y.; an addition to the Elmira Reformatory at Elmira, N. Y., calling for 100 tons, and 100 tons for a jail at Bath, N. Y.

Old Material

No important transactions in scrap have occurred in the past week. Prices, while not actually higher, are slightly stronger. It appears that dealers who took orders from a large consumer recently at \$11 for No. 1

heavy melting steel and \$9.50 for No. 2 steel will have difficulty in filling these at a profit.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$10.50 to \$11.00
No. 2 heavy melting scrap.....	9.00 to 9.50
Scrap rails.....	11.00
Hydraul. comp. sheets.....	9.00 to 9.50
Hand bundled sheets.....	8.00 to 8.50
Drop forge flashings.....	9.00 to 9.50
No. 1 busheling.....	9.00 to 9.50
Hvy. steel axle turnings.....	10.50 to 11.00
Machine shop turnings.....	5.50 to 6.00
No. 1 railroad wrought.....	9.00 to 9.50
Acid Open-Hearth Grades:	
Knuckles and couplers.....	13.50 to 14.00
Coil and leaf springs.....	13.50 to 14.00
Roller steel wheels.....	13.50 to 14.00
Low phosph. billet and bloom ends.....	15.00 to 15.50
Electric Furnace Grades:	
Short-shov. steel turnings.....	8.50 to 9.00
Blast Furnace Grades:	
Short mixed borings and turnings.....	7.00 to 7.25
Cast iron borings.....	7.00 to 7.25
No. 2 busheling.....	6.00
Rolling Mill Grades:	
Steel cut axles.....	15.00 to 15.50
Iron axles.....	16.00 to 16.50
Cupola Grades:	
No. 1 machinery cast.....	11.00 to 11.50
Stove plate.....	9.50 to 10.00
Locomotive grate bars.....	8.25 to 9.25
Steel rails, 3 ft. and under.....	15.00 to 15.50
Cast iron car wheels.....	12.00 to 12.50
Malleable Grades:	
Industrial.....	11.00 to 12.00
Railroad.....	11.00 to 12.00
Agricultural.....	11.00 to 12.00
Special Grades:	
Chemical borings.....	9.50 to 10.00

BOSTON Pig Iron Sales Drop to 1000 Tons for Week—Scrap Dull

BOSTON, Feb. 24.—An abrupt drop in pig iron sales, from approximately 5000 tons the previous week to not more than 1000 tons the past week, is reported. Foundries that had been expected to be in the market for iron now say that, based on present plant operations, they have sufficient in stock or on order to carry them through the first half of 1931. It is possible, however, that a Massachusetts melter will shortly be in the market for a round tonnage. In the absence of business, prices have little opportunity to change, but the general undertone of the market is easy.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25.....	\$19.91 to \$20.91
*Buffalo, sil. 2.25 to 2.75.....	19.91 to 20.91
*Ala., sil. 1.75 to 2.25.....	21.11 to 21.61
*Ala., sil. 2.25 to 2.75.....	21.61 to 22.11
*Ala., sil. 1.75 to 2.25.....	17.25 to 17.75
*Ala., sil. 2.25 to 2.75.....	17.75 to 18.25

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.
†Rail and water rate.

Old Material

Scrap prices were steady and unchanged the past week. The American Steel & Wire Co., Worcester, Mass., continues to take scattered car lots

of No. 1 heavy melting steel and bundled skeleton. An occasional car of mixed borings and steel mill borings moved to Pennsylvania delivery points, but

Warehouse Prices, f.o.b. Boston

	Base per lb.
Plates.....	3.26 1/2c.
Structural shapes.....	3.26 1/2c.
Angles and beams.....	3.26 1/2c.
Tees.....	3.26 1/2c.
Zees.....	3.26 1/2c.
Soft steel bars, small shapes.....	3.26 1/2c.
Reinforcing bars.....	3.11 1/2c. to 3.26 1/2c.
Iron bars—	
Refined.....	3.26 1/2c.
Best refined.....	4.60c.
Norway rounds.....	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth.....	5.00c. to 10.00c.
Crucible.....	12.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	4.015c. to 5.00c.
Hoop steel.....	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.00c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.80c.
Per Cent Off List	
Machine bolts.....	60 and 5
Carriage bolts.....	60 and 5
Lag screws.....	60 and 5
Hot-pressed nuts.....	60 and 5
Cold-punched nuts.....	60 and 5
Stove bolts.....	70 and 10

the market otherwise was quiet the past week. Industrial activity has not increased sufficiently to increase the production of scrap very much, and those having old material on hand are reluctant to sell at prevailing prices.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$6.75 to \$7.10
Scrap T rails	6.50 to 7.00
Scrap girder rails	5.50 to 6.00
No. 1 railroad wrought	7.00 to 7.50
Machine shop turnings	2.00 to 2.60
Cast iron borings (steel works and rolling mill)	2.00 to 2.60

Bundled skeleton, long	6.00 to 6.10
Forge flashings	5.50 to 6.10
Blast furnace borings and turnings	2.00 to 2.60
Forge scrap	5.25 to 5.75
Shafting	13.00 to 13.50
Steel car axles	14.00 to 15.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	6.50 to 7.00
Rails for rolling	8.50 to 9.00
Cast iron borings, chemical	9.00 to 9.60
No. 2 cast	5.10 to 5.60

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$9.00 to \$9.50
No. 1 machinery cast	10.50 to 11.00
Stove plate	7.00 to 7.25
Railroad malleable	13.00 to 13.50

CINCINNATI Pig Iron Sales Larger—Sheet Demand Improves

CINCINNATI, Feb. 24.—Reflecting the better feeling in the district market, sales of pig iron in the past week were larger than in the preceding week. Furnace representatives report total orders for about 4000 tons, of which about 700 tons in small lots went to Southern furnaces. The melt has remained about the same as in the preceding week, when a slight improvement was noticed. Foundries are figuring on a fair amount of work, but when the business may be closed is problematical. While sales of pig iron have improved, consumers are not anticipating their needs beyond 30 days. They are feeling their way until definite improvement in conditions arrives. Inquiry is for lots of less than 100 tons. The only sizable order was from a south central Ohio buyer for 1500 tons of Northern foundry.

Prices per gross ton, deliv'd Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	\$14.19 to \$14.69
Ala. fdy., sil. 2.25 to 2.75	14.69 to 15.19
Tenn. fdy., sil. 1.75 to 2.25	14.19 to 14.69
8'ch'n Ohio silvery, 8 per cent	24.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Coke

Shipments of foundry coke on contract improved slightly last week. New business, however, is small.

Finished Steel

Orders placed with nearby mills last week were larger in the aggregate than in the preceding week. The leading sheet interest states that its business was the largest for any week in the past six months. Production also increased substantially above the recent 50 per cent level.

Sheet demand is well divided among all the consuming industries. With automobile manufacturers indicating increased operations for the second quarter, future sheet demand appears good.

While mills are taking scrap on old commitments, new business is small and infrequent. Dealers' bids on some items are lower.

Old Material

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	\$9.00 to \$10.00
Scrap rails for melting	10.50 to 11.00
Loose sheet clippings	5.50 to 6.00
Bundled sheets	8.75 to 9.25
Cast iron borings	4.50 to 5.00
Machine shop turnings	2.00 to 2.50
No. 1 bushing	8.00 to 8.50
No. 2 bushing	4.50 to 5.00
Rails for rolling	11.50 to 12.00
No. 1 locomotive tire	10.00 to 10.50
No. 2 railroad wrought	9.50 to 10.00
Short rails	14.25 to 14.75
Cast iron carwheels	10.50 to 11.00
No. 1 machinery cast	14.00 to 14.50
No. 1 railroad cast	12.00 to 12.50
Burd cast	6.50 to 7.00
Stove plate	6.50 to 7.00
Brake shoes	6.50 to 7.00
Agricultural malleable	11.00 to 11.50
Railroad malleable	12.00 to 12.50

National Steel Corp. Renames Four Lake Boats

Four Lake boats operated by the Producers' Steamship Co., a division of the National Steel Corp., have been renamed, three after men associated with that corporation's management. These boats are named the George R. Fink, for the president of the National Steel Corp. and of two of its subsidiaries, the Michigan Steel Corp. and the Great Lakes Steel Corp.; John C. Williams, for the vice-president and a director of the National corporation and president of the Weirton Steel Co., and the Edwin W. Mudge, for the assistant secretary-treasurer and director of the National Steel Corp. The fourth boat is named the David M. Weir, in honor of the former vice-president of the Weirton Steel Co.

Canada

Business Expanding Slowly but Steadily

TORONTO, Feb. 24.—New business in the Canadian iron and steel markets is picking up. The demand for merchant pig iron, while still largely confined to small spot tonnages, is growing in volume each week. A few melters were in the market during the week for iron to be delivered to the end of March, while others are inquiring for supplies for second quarter. Bookings for forward delivery, however, are small. Melters in Ontario and Quebec are slowly stepping up production. While iron production in January was lower than that of any month last year, February output is expected to show improvement. Four furnaces are in blast. Pig iron prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	20.50

Structural Steel

New business is developing in better tonnages, the greater part, however, being in lots under 500 tons each. Specifications are out for several large bridge and building jobs, which are expected to be closed next month.

Old Material

Demand for scrap is expanding. The improvement is mostly in iron grades, although sales of steel scrap were slightly heavier for the week. Prices are unchanged.

Dealers' buying prices for old material, Per Gross Ton

	Toronto	Montreal
Heavy melting steel	\$7.00	\$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	—	10.00
Stove plate	—	8.00
Standard carwheels	—	8.50
Malleable	—	8.00

Per Net Ton	
No. 1 mach'ry cast	11.00
Stove plate	9.00
Standard carwheels	10.00
Malleable scrap	9.00

Bosshardt Steel Corp., Canton, Ohio, has been organized to take over the steel foundry formerly operated by the Canton Steel Foundry Co. The officers are L. J. Harley, Jr., president and general manager; W. J. Willis, vice-president and works manager; E. A. McCuskey, secretary, and William B. Gschwend, treasurer.

Warehouse Prices, f.o.b. Cincinnati

Base per Lb.	
Plates and struc. shapes	3.25c
Bars, soft steel or iron	3.15c
New billet reinfrc. bars	3.15c
Rail steel reinfrc. bars	3.00c
Hoops	3.90c
Bands	3.35c
Cold-fin. rounds and hex.	3.80c
Squares	4.30c
Black sheets (No. 24)	4.05c
Galvanized sheets (No. 24)	4.90c
Blue ann'd sheets (No. 10)	3.45c
Structural rivets	4.20c
Small rivets	.60 per cent off list
No. 9 ann'd wire, per 100 lb.	\$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c'd nails, base 100 lb keg	2.95
Chain, per 100 lb.	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in.	\$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

Mill Prices of Semi-Finished Steel

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$20.00
Rerolling, 4-in. and under 10-in., Youngstown	30.00
Rerolling, 4-in. and under 10-in., Cleveland	30.00
Rerolling, 4-in. and under 10-in., Chicago	32.00
Foreign quality, Pittsburgh	35.00

Sheet Bars	
	Per Gross Ton
(Open Hearth or Bessemer)	
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Slabs	
	Per Gross Ton
(8 in. x 2 in. and under 10 in. x 10 in.)	
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Skelp	
	Per Lb.
(F.o.b. Pittsburgh or Youngstown)	
Grooved	1.40c.
Universal	1.50c.
Sheared	1.60c.

Wire Rods	
	Per Gross Ton
(Common soft, base)	
Pittsburgh	\$25.00
Cleveland	25.00
Chicago	25.00

Prices of Raw Material

Ores	
	Per Gross Ton
Lake Superior Ores, Delivered Lower Lake Ports	
Old range Bessemer, 51.50% iron	\$4.50
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.55
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	
Iron ore low phosph., copper free, 55 to 58% iron in dry Spanish or Algeria, 8c. to 9c.	
Iron ore, low phosph., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52% iron	24c. to 26c.
Manganese ore, Brazilian, 46 to 48% iron	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.25
Chrome ore, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$20.00
Chrome ore, 48% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	22.50

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.50
Foundry, f.o.b. Connellsville prompt	\$3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.35 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 1/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.65 to .75
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.15

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$80.00 to \$85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	80.00 to 85.00

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00

	Per Gross Ton Furnace	Per Gross Ton Delivered
10%	\$35.00	\$39.00
11%	37.00	39.00

Bessemer Ferrosilicon	
	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
10%	\$25.00
11%	26.00
12%	27.00

Silvery Iron	
	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
6%	\$21.00
7%	21.50
8%	22.00
9%	22.50
10%	23.00

Other Ferroalloys	
	Per Lb. contained metal
Ferrotungsten, per lb. contained metal	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	24.50c. to 25.00c.
Ferrocromium, 0.06% carbon	26.50c. to 28.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium, 15 to 18% per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18% Rockdale, Tenn., base per gross ton	\$1.00
Ferrophosphorus, electric 24% f.o.b. Anniston, Ala., per gross ton	122.50
Silico-manganese, gross ton, delivered	135.00

Fluxes and Refractories	
	Per Net Ton
Fluorspar	
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$14.00 to \$14.50
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	\$43.00 to \$46.00 \$35.00 to \$38.00
Maryland	43.00 to 46.00 35.00 to 38.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00 35.00 to 38.00
Kentucky	43.00 to 46.00 35.00 to 38.00
Missouri	43.00 to 46.00 35.00 to 38.00
Illinois	43.00 to 46.00 35.00 to 38.00
Ground fire clay, per ton	7.00

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$35.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick	
	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts	
	Per Cent Off List
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
Machine bolts	.73
Carriage bolts	.73
Lag bolts	.73
Plow bolts, Nos. 1, 2, 3 and 7 heads	.73
Hot-pressed nuts, blank or tapped, square	.73
Hot-pressed nuts, blank or tapped, hexagons	.73
C.p.c. and t. square or hex. nuts, blank or tapped	.73
Washers*	.700c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
 *Bolts with rolled thread up to and including 1/2 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagon nuts	.73
Semi-finished hexagon castellated nuts, S.A.E.	.73
Stove bolts in packages, P'gh.	.80, 10, 10 and 5
Stove bolts in packages, Chicago	.80, 10, 10 and 5
Stove bolts in packages, Cleveland	.80, 10, 10 and 5
Stove bolts in bulk, P'gh.	.80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Chicago	.80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	.80, 10, 10, 5 and 2 1/2
Tire bolts	.60, 10 and 10

Discounts of 75 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets	
	Base per 100 Lb.
(1/2-in. and larger)	
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets	
	Per Cent Off List
(3/16-in. and smaller)	
F.o.b. Pittsburgh	.70, 10 and 5
F.o.b. Cleveland	.70, 10 and 5
F.o.b. Chicago	.70, 10 and 5

Cap and Set Screws	
	Per Cent Off List
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
Milled cap screws	.80, 10, 10 and 5
Milled standard set screws, case hardened	.80 and 5
Milled headless set screws, cut thread	.75 and 10
Upset hex. head cap screws, U.S.S.S. thread	.85 and 10
Upset hex. cap screws, S.A.E. thread	.85 and 10
Upset set screws	.80, 10 and 5
Milled studs	.70

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars

Soft Steel	
	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.70c. to 1.75c.
Del'd Philadelphia.....	1.94c.
Del'd New York.....	1.93c.
F.o.b. Cleveland.....	1.65c. to 1.70c.
F.o.b. Lackawanna.....	1.75c.
F.o.b. Birmingham.....	1.80c.
C.I.F. Pacific ports.....	2.25c.
F.o.b. San Francisco mills.....	2.25c.

Billet Steel Reinforcing	
	Base per Lb.
F.o.b. P'gh mills, 40, 50, 60-ft.....	1.75c.
F.o.b. Birmingham, mill lengths.....	1.75c. to 1.80c.

Rail Steel	
	Base per Lb.
F.o.b. mills, east of Chicago dist.....	1.50c. to 1.55c.
F.o.b. Chicago Heights mill.....	1.60c. to 1.65c.
Del'd Philadelphia.....	1.84c. to 1.89c.

Iron	
	Base per Lb.
Common iron, f.o.b. Chicago.....	1.70c. to 1.75c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c.
Del'd Cleveland.....	1.78 1/2c. to 1.83 1/2c.
Del'd Philadelphia.....	1.85 1/2c.
F.o.b. Coatesville.....	1.75c.
F.o.b. Sparrows Point.....	1.75c.
F.o.b. Lackawanna.....	1.75c.
Del'd New York.....	1.93c.
C.I.F. Pacific ports.....	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c.
F.o.b. Lackawanna.....	1.75c.
F.o.b. Bethlehem.....	1.75c.
Del'd Cleveland.....	1.78 1/2c. to 1.83 1/2c.
Del'd Philadelphia.....	1.76c.
Del'd New York.....	1.90 1/2c.
C.I.F. Pacific ports.....	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.65c.
Wider than 6 in., P'gh.....	1.55c.
6 in. and narrower, Chicago.....	1.75c.
Wider than 6 in., Chicago.....	1.65c.
Cooperage stock, P'gh.....	1.90c.
Cooperage stock, Chicago.....	2.00c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	2.45c. to 3.40c.
Strips, P'gh.....	2.25c. to 2.35c.
Strips, Cleveland.....	2.25c. to 2.35c.
Strips, del'd Chicago.....	2.53c.
Strips, Worcester.....	2.50c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.40c.

*According to size.

Wire Products

To Jobbing Trade	
	Base per Lb.
Smooth annealed wire.....	2.35c.
Smooth galvanized wire.....	2.80c.
Base per Keg	
Standard wire nails.....	\$1.90
Smooth coated nails.....	1.90
Galvanized nails.....	3.90
To Manufacturing Trade	
	Base per Lb.
Bright wire.....	2.20c.
Spring wire.....	3.20c.
To Jobbing Trade	
	Base per Lb.
Polished staples.....	2.35c.
Galvanized staples.....	2.60c.
Barbed wire, galvanized.....	2.55c.
To Retail Trade	
	Base per Lb.
Bright wire.....	2.30c.
Smooth annealed wire.....	2.40c.
Smooth galvanized wire.....	2.90c.
Base per Keg	
Standard wire nails.....	\$2.00
Cement coated nails.....	2.00
Galvanized nails.....	4.00
Base per Lb.	
Polished staples.....	2.45c.
Galvanized staples.....	2.70c.
Barbed wire, galvanized.....	2.65c.
Woven wire fence per net ton.....	\$65.00

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh.....	1.90c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.00c.
No. 10, blue annealed, del'd Phila.....	2.19c.
No. 10, blue annealed, B'ham.....	2.05c.

Sheets

Blue Annealed	
	Base per Lb.
No. 13, f.o.b. P'gh.....	2.05c.
No. 13, f.o.b. Chicago dist.....	2.15c.
No. 13, del'd Philadelphia.....	2.34c.
No. 13, blue annealed, B'ham.....	2.20c.

Box Annealed, One Pass Cold Rolled	
	Base per Lb.
No. 24, f.o.b. Pittsburgh.....	2.35c.
No. 24, f.o.b. Chicago dist. mill.....	2.45c.
No. 24, del'd Philadelphia.....	2.64c.
No. 24, f.o.b. Birmingham.....	2.50c.

Steel Furniture Sheets	
	Base per Lb.
No. 24, f.o.b. P'gh.....	3.60c.

Galvanized	
	Base per Lb.
No. 24, f.o.b. Pittsburgh.....	2.90c.
No. 24, f.o.b. Chicago dist. mill.....	3.00c.
No. 24, del'd Cleveland.....	3.08 1/2c.
No. 24, del'd Philadelphia.....	3.24c.
No. 24, f.o.b. Birmingham.....	3.05c. to 3.15c.

Continuous Mill Sheets	
	Base per Lb.
No. 10 gage.....	1.75c.
No. 13 gage.....	1.90c.

Tin Mill Black Plate	
	Base per Lb.
No. 28, f.o.b. Pittsburgh.....	2.55c. to 2.65c.
No. 28, f.o.b. Chicago dist. mill.....	2.65c. to 2.75c.

Automobile Body Sheets	
	Base per Lb.
No. 20, f.o.b. Pittsburgh.....	3.30c.

Long Terns	
	Base per Lb.
No. 24, 8-lb. coating, f.o.b. mill.....	3.25c. to 3.35c.

Vitreous Enameling Stock	
	Base per Lb.
No. 24, f.o.b. Pittsburgh.....	3.70c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills.....	\$5.00
Standard cokes, f.o.b. Gary.....	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)	
	Base per Box
8-lb. coating I.C. \$10.30.....	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90.....	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00.....	40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)	
Alloy Quantity Bar Base, 2.65c. per Lb.	
S.A.E. Series	Alloy
Numbers	Differential
2000 (1/2% Nickel).....	\$0.25
2100 (1 1/2% Nickel).....	0.55
2300 (5 1/2% Nickel).....	1.50
2500 (15% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

	Base per 100 Lb.
Spikes, 3/4 in. and larger.....	\$2.80
Spikes, 1/2 in. and larger.....	2.80

Spikes, boat and barge.....	\$3.00
Tie plate, steel.....	1.95
Angle bars.....	2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Steel	
Inches	Black Galv.
1/4.....	47 21 1/2
3/4 to 1 1/2.....	58 27 1/2
1 1/2 to 2.....	62 50 1/2
2 to 3.....	64 52 1/2
3 to 4.....	57 45 1/2
4 to 6.....	61 49 1/2
6 and 8.....	58 45 1/2
9 and 10.....	56 43 1/2
11 and 12.....	55 42 1/2

Iron	
Inches	Black Galv.
1/4 and 3/4.....	11 +36
1/2.....	23 5
3/4.....	28 11
1 and 1 1/4.....	31 15
1 1/2 and 2.....	35 18

Lap Weld	
Inches	Black Galv.
2.....	23 5
2 1/2 to 3 1/2.....	28 13
4 to 6.....	30 15
7 and 8.....	29 16
9 to 12.....	26 11

Butt Weld, extra strong, plain ends	
Inches	Black Galv.
1/4.....	43 26 1/2
1/2 to 3/4.....	49 32 1/2
3/4.....	55 44 1/2
1 to 1 1/2.....	60 49 1/2
1 1/2 to 2.....	62 51 1/2
2 to 3.....	63 52 1/2

Lap weld, extra strong, plain ends	
Inches	Black Galv.
2.....	55 44 1/2
2 1/2 to 4.....	59 48 1/2
4 1/2 to 6.....	58 47 1/2
7 to 8.....	54 41 1/2
9 and 10.....	47 34 1/2
11 and 12.....	46 33 1/2

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discount of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh	
Steel	Charcoal Iron
2 in. and 2 1/4 in.....	38 1 1/2 in..... 1
2 1/2 in.—2 3/4 in.....	46 1 3/4 in..... 8
3 in.....	52 2 in.—2 1/4 in..... 13
3 1/4 in.—3 3/4 in.....	54 2 1/2 in.—2 3/4 in..... 16
4 in.....	57 3 in..... 17
4 1/2 in. to 6 in.....	46 3 1/4 in. to 3 3/4 in..... 18
	4 in..... 20
	4 1/2 in..... 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts: Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
Inches	Base
1 in.....	61 3 in..... 46
1 1/4 to 1 1/2 in.....	63 3 1/4 to 3 1/2 in..... 48
1 3/4 in.....	37 4 in..... 51
2 to 2 1/4 in.....	32 4 1/2, 5 and 6 in..... 46
2 1/2 to 2 3/4 in.....	40

Hot Rolled	
Inches	Base
2 and 2 1/4 in.....	38 3 1/4 to 3 1/2 in..... 54
2 1/2 and 2 3/4 in.....	46 4 in..... 57
3 in.....	52 4 1/2, 5 and 6 in..... 46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List	
Carbon	Base (carloads).....
0.10% to 0.30% base (carloads).....	55
0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

Western Metal Congress

Five-Day Meeting at San Francisco Participated In
by Several Associations

THE Western Metal Congress concluded on Feb. 20 a five-day session in San Francisco. It was held under the auspices of the American Society for Steel Treating and was the second event of its kind to be held on the Pacific Coast. The first Western congress was held at Los Angeles in January, 1929. As on the first occasion, the congress consisted of technical sessions each day and of a large exhibition, participated in by representatives of iron, steel and metal-working companies located on the Pacific Coast, and of companies in the East which have representatives in that territory.

The technical sessions were participated in by eight technical and trade organizations, in addition to the American Society for Steel Treating, among them the Pacific Coast Gas Association, the American Welding Society, the American Institute of Mining and Metallurgical Engineers, the American Chemical Society, American Society of Mechanical Engineers, the Society of Automotive Engineers and the American Society for Testing Materials.

Each society was assigned a special day for the presentation of its technical papers. There were 28 different papers scheduled during the week. All

the morning sessions were held at the St. Francis Hotel, with the afternoon sessions at the exhibit, which was held in the Civic Auditorium. The attendance at the technical sessions varied from 200 to 400 members and guests, a large attendance having been a feature of the last two days. Some of the papers will be abstracted in later issues of THE IRON AGE.

There were 162 exhibitors who used about 35,000 sq. ft. of space in the Civic Auditorium. Many of the exhibitors doubled up on booths because some Western representatives of some of these exhibits were handling more than one account. The main portion of the exhibit was on the floor of the arena of the auditorium and the various corridors on all sides of the arena were also well occupied with booths.

Keen interest was taken in the exhibits and the attendance was very large, particularly during the evenings.

Besides the secretary of the A. S. S. T., W. H. Eiseman, there were present several other national officers, including J. M. Watson, president; A. H. D'Arcambal, vice-president; R. G. Guthrie, B. F. Shephard, F. B. Drake, directors. A. O. Fulton, national treasurer, of Boston, was also present as well as several prominent metallurgists from the East.

Reinforcing Steel

New Projects Will Take
15,850 Tons

INCLUDING 6500 tons for a municipal filtration plant in New York and 5000 tons for State highway work in Oklahoma, reinforcing bar inquiries brought out in the last week amounted to 15,850 tons. Awards totaled only 3400 tons and included 1500 tons for highway work near Chicago. Awards follow:

FLINT, MICH., 210 tons, filtration plant, to Capitol Steel Corp.
CLEVELAND, 250 tons, addition to May 120 store, to Republic Steel Corp.
CLEVELAND, 100 tons, South High School, to Concrete Engineering Co.
MILWAUKEE, 150 tons, United States Engineers' Office, to Inland Steel Co.
MILWAUKEE, 200 tons, school, to Kalmar Steel Co.
CHICAGO, 1000 tons, State and Cook County road work, to various bidders; bids is in addition to tonnage reported last week.
JANESVILLE, WIS., 150 tons, Turtle Creek overhead and approaches; general contract to Hansen-Beckman & Co., Beloit, Wis.

OAKLAND, CAL., 200 tons, pier, foot of Webster Street, to Soule Steel Co.

OAKLAND, 200 tons, school for College of Holy Name, to Concrete Engineering Co.

LOS ANGELES, 500 tons, Times-Mirror building, to an unnamed bidder.

DAKESVILLE, PA., 120 tons, sewer construction.

WESTMINSTER, 100 tons, fittings for 16-in. diameter of Justice Building.

CAMDEN, N. J., 150 tons, Court House building.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW YORK, 6500 tons, foundation for city incinerator plant on Ward's Island.
BIRMINGHAM, 850 tons, foundations for new Post Office; bids close Feb. 27.
CLEVELAND, 200 tons, John Carroll University.
NASHVILLE, TENN., 120 tons, Rhea County bridge for Tennessee Highway Commission.
FORT WAYNE, IND., 1000 tons, filtered water reservoir.
CHICAGO, 1200 tons, building for Albert Pick.
CHICAGO, tonnage being estimated, elevator for Rosenbaum Grain Co.

CHICAGO, 5000 tons for Sanitary District trustees; bids to be readvertised.

OKLAHOMA CITY, 5000 tons, State highways; bids taken Feb. 24 by Oklahoma State Highway Commission.

WESTWOOD, CAL., 300 tons, dormitory for University of California; bids being taken.

SANTA ANA, CAL., 102 tons, subway; bids opened Feb. 24.

SACRAMENTO, 210 tons, highway work in San Joaquin County; bids opened.

Fabricated Steel Orders 17,514 Tons in Jan. 31 Week

WASHINGTON, Feb. 24.—Bookings of fabricated structural steel in the week ended Jan. 31 totaled 17,514 tons, according to reports received from 101 establishments by the Bureau of the Census. Bookings in the previous week reported by 108 establishments were 10,822 tons.

Foundry Equipment Orders Increase in January

Foundry equipment orders gained in January, according to the report of the Foundry Equipment Manufacturers' Association, based on returns from 17 members. The January index figure on sales was 65.3, compared with 59.8 in December and 45.3 in November. The three months' moving average stood at 56.8 at the end of January, compared with 51.7 a month previous.

Shipments were lower in January, however, having been represented by the figure 54.69, against 102.6 in December. The December shipments decreased unfilled orders to 82.3, from which there was a rise to 94.6 in January.

The association's index figures are based on 100 as representing average monthly shipments for 1922, 1923 and 1924.

Detroit Scrap Prices Decline Further

DETROIT, Feb. 24.—There has been a further recession in scrap prices, with heavy melting steel and hydraulic compressed sheets off 50c. a ton. The decline is attributed to much larger scrap production by automobile plants without a corresponding gain in demand from steel mills and also to termination of a fictitious situation created by operations of local scrap dealers. March scrap lists of automobile manufacturers indicate substantial improvement in motor car output.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov.	\$9.25 to \$9.75
steel	5.25 to 5.75
Borings and short turnings	4.50 to 5.00
Long turnings	9.50 to 10.00
No. 1 machinery cast	11.00 to 11.50
Automotive cast	9.00 to 9.50
Hydraulic comp. sheets	6.75 to 7.00
Stove plate	7.75 to 8.25
New No. 1 busheling	3.25 to 3.75
Old No. 2 busheling	6.25 to 6.50
Sheet clippings	7.50 to 8.00
Flashings	

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Again Higher—Tin Advancing—Lead Higher —Zinc Easy

NEW YORK, Feb. 24.

Copper

Demand for copper has continued to increase, particularly from abroad, and prices have again advanced. On Feb. 19, Copper Exporters, Inc., advanced the foreign price from 10.30c., c.i.f. usual European ports, to 10.55c. Buying from abroad has been so heavy that the total thus far this month has been about 45,500 gross tons. This compares with 35,000 tons for all of January and with 30,000 tons for December. Purchases by domestic consumers have also been quite liberal. There has been some agitation to advance the price more rapidly, but it appears probable that a policy of gradual improvement will prevail. Some anticipate further advances in the near future. The Washington Birthday holiday has slowed up the domestic market, but sales for export yesterday were heavy and have continued today. Electrolytic copper is now quoted at 10.25c., delivered in the Connecticut Valley, with Lake copper at 10.25c. to 10.37½c., delivered.

Tin

Prices for spot Straits tin have increased during the week, both here and in London. The quotation today at New York is 27.12½c., and prices in London are about £4 a ton higher than a week ago, with spot standard quoted at £122 7s. 6d., future standard at £123 15s. and spot Straits at £125 2s. 6d. The Singapore price today was £124 17s. 6d. The market in general was very firm up to Friday, Feb. 20, on which day the official sanction for curtailment of output was made public in London. This was followed by profit taking over there and here. Sales in the East were heavy and at lower prices and the general market was weak the following day. Most of the buying here was by speculators, consumers being inactive. London was the leader of the advance. Shipments from the Straits had been very heavy this month, totaling 7125 tons to Feb. 21, inclusive. Stocks in British warehouses at the end of last week totaled 24,571 tons, an increase of 455 tons for the week ended Feb. 21.

Lead

The heavy buying, which has been a feature recently, has lifted the mar-

THE WEEK'S PRICES—CENTS PER POUND FOR EARLY DELIVERY

	Feb. 21	Feb. 21	Feb. 20	Feb. 19	Feb. 18
Lake copper, New York	10.37½	10.37½	10.37½	10.37½	10.25
Electrolytic copper, N. Y.*	10.00	10.00	10.00	10.00	9.87½
Straits tin, spot, N. Y.	27.12½	26.62½	27.10	27.10	26.75
Zinc, East St. Louis	3.95	3.95	3.95	3.95	3.95
Zinc, New York	4.30	4.30	4.30	4.30	4.30
Lead, St. Louis	4.35	4.35	4.35	4.35	4.30
Lead, New York	4.60	4.60	4.60	4.60	4.50

*Refinery quotation, price ½¢ higher delivered in the Connecticut Valley.

ket to such a strong position that the American Smelting & Refining Co. advanced its contract price on Feb. 19 from 4.50c. to 4.60c., New York. The corresponding quotation in the outside market now stands at 4.35c., St. Louis. Activity has abated somewhat, but there is still a desire to purchase April metal, which sellers are discouraging.

Zinc

Some disappointment is expressed in the trend of this market since a week ago. Instead of advancing, as was expected, further slight weakness has developed, and prime Western metal has been available all the week at 3.95c., East St. Louis, which compares with 4c. a week ago. The cause is a distinct falling off in demand. The price in the East stands at 4.30c., New York.

Antimony

Demand continues light. Chinese metal is quoted at 7.10c. for spot and 6.87½c. to 7c. for futures, New York, duty paid.

Nickel

According to long established prices, wholesale lots of ingot nickel are quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum

Virgin metal, 98 to 99 per cent pure, is obtainable at the published quotation of 22.00c. a lb. delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Feb. 23.—Prices, with the exception of zinc, which is down, and antimony, which has remained sta-

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	17.12½c.
*Copper, hot rolled, base sizes	20.00c.
Seamless Tubes—	
Brass	22.00c.
Copper	22.12½c.
Brass Rods	15.37½c.
Brass Tubes	25.00c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 24)	9.75c. to 10.25c.
Zinc sheets, open	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	29.00c. to 30.00c.
Tin, bar	30.00c. to 31.00c.
Copper, Lake	11.50c. to 12.00c.
Copper, electrolytic	11.25c. to 11.75c.
Copper, casting	11.00c. to 11.50c.
Zinc, slab	5.50c. to 6.50c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	7.50c. to 8.50c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy	25.00c. to 26.00c.
Babbitt metal, commercial grade	25.00c. to 26.00c.
Solder, ½ and ¾	19.75c. to 20.75c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	29.75c.
Tin, bar	31.75c.
Copper, Lake	11.13c.
Copper, electrolytic	11.13c.
Copper, casting	10.75c.
Zinc, slab	5.50c.
Lead, American pig	5.35c. to 5.50c.
Lead, bar	8.00c.
Antimony, Asiatic	11.00c.
Babbitt metal, medium grade	15.25c.
Babbitt metal, high grade	23.75c.
Solder, ½ and ¾	19.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.00c.	9.00c.
Copper, hvy. and wire	7.75c.	8.75c.
Copper, light and bottom	7.00c.	8.00c.
Brass, heavy	4.50c.	5.50c.
Brass, light	4.00c.	4.75c.
Hvy. machine composition	7.00c.	8.00c.
No. 1 yel. brass turnings	5.00c.	5.50c.
No. 1 red brass or compos. turnings	6.50c.	7.50c.
Lead, heavy	3.25c.	3.75c.
Lead, tea	2.60c.	2.50c.
Zinc	2.60c.	2.50c.
Sheet aluminum	7.50c.	9.50c.
Cast aluminum	5.00c.	7.50c.

tionary, have moved to higher levels. Consumer interest is making little headway.

Prices per lb. in carload lots: Lake copper, 10.75c.; tin, 27.75c.; lead, 4.45c.; zinc, 4.05c.; in less-than-carload lots, antimony, 8.25c. On old metals we quote copper wire, crucible

shapes and copper clips, 7.50c.; copper bottoms, 6.50c. to 7c.; red brass, 6.50c. to 7c.; yellow brass, 4.50c. to 5c.; lead pipe, 3.50c. to 3.75c.; zinc, 1c. to 1.25c.; pewter, No. 1, 14.50c.; tin-foil, 15.50c.; block tin, 21.50c.; aluminum, 6c. to 6.50c.; all being dealers' prices for less-than-carload lots.

Fabricated Structural Steel

Awards Totaling 55,000 Tons Include 41,000 Tons for Cincinnati Railroad Terminal—30,000 Tons Pending

PLACING of two large contracts for the Cincinnati railroad terminal project, requiring more than 41,000 tons, swelled the total of structural awards reported during the week to 55,000 tons, the second highest tonnage of the year. Otherwise, lettings were generally light, with small jobs in the East accounting for most of the tonnage.

New inquiries amounted to 30,000 tons, a considerable decline from the average for the year to date. Included was 7000 tons for approaches to a municipal bridge at St. Louis. Awards follow:

North Atlantic States

BOSTON, 300 tons, Edison Electric Illuminating Co. plant rebuildings, to New England Structural Co.

BOSTON, 300 tons, bridge for coffeehouse, to Bethlehem Steel Co.

NEW YORK, 2000 tons, church and apartment building at Park Avenue and Thirty-fourth Street, to McClintic-Marshall Co.

NEW YORK, 100 tons, garage in Queens Plaza for Colonial Dye Works, to Allied Bridge & Iron Works.

NEW YORK, 100 tons, Paramount warehouse at 422 West Forty-fourth Street, to Lacher Structural Steel Co.

BROOKLYN, 300 tons, Nurses' home and children hospital in Albany Avenue, to B. Schmidt & Son.

BROOKLYN, 300 tons, remodeling water-tanks for H. K. Ferguson Co. on J Street, to Fort Pitt Bridge Works Co.

NEW YORK, N. J., 150 tons, addition to high school, to P. G. Shaffer Iron Works.

NEWARK, N. J., 150 tons, building for New Jersey Historical Society, to Charles Guther, Inc.

IRVINGTON, N. J., 200 tons, municipal building, from Aufder-Hohe Contracting Co., general contractor, to municipal fabricator.

ATLANTA, N. Y., 300 tons, school, to Kellough Structural Steel Co.

SARATOGA COUNTY, N. J., 250 tons, highway bridge.

CLARK, N. Y., 100 tons, bonded and school for reformatories, to Kellough Structural Steel Co.

WATERBURY, N. Y., 100 tons, new secondary County Jail, to H. S. McManus Steel Construction Co.

HOMEROWN, PA., 1275 tons, bridge for Central Railroad of New Jersey, to Phoenix Bridge Co.

STATE HARBOR, PA., 200 tons, power house and substation for State Electric Water Power Corp., to American Bridge Co.

PHILADELPHIA, Pa., 120 tons, bridge, to Phoenix Bridge Co.

BALTIMORE, 200 tons, building for H. Winkler Co., to Belmont Iron Works.

The South

LOUISIANA, 100 tons, city building, to H. H. Puchner & Supply Co., to Quincy Iron Works.

BROOKS COUNTY, GA., 100 tons, highway bridge, to McClintic-Marshall Co.

Central States

DAY CITY, MICH., 600 tons, building for Industrial Brownhoist Corp., to Whitehead & Kates Co.

DETROIT, 240 tons, city chemical building, to Mahon Structural Steel Co.

BELOIT, WIS., 295 tons, Turtle Creek bridge, to McClintic-Marshall Co.

CINCINNATI, 17,240 tons, Union Terminal project, to McClintic-Marshall Co.

CINCINNATI, 24,000 tons, passenger station as part of Union Terminal project, to Mahon Structural Steel Co.

STATE OF WISCONSIN, 350 tons, highway bridge, to Wisconsin Bridge Co.

ILLINOIS CENTRAL, 350 tons, bridge, to Virginia Bridge & Iron Co.

MISSOURI PACIFIC RAILROAD, 100 tons, bridge, to McClintic-Marshall Co.

Western States

SEATTLE, WASH., 100 tons, checks for pipe line for Ford Motor Co., to Best Tank & Pipe Co.

TACOMA, WASH., 312 tons, bridge over Puyallup River, to Virginia Bridge & Iron Co.

SAN FRANCISCO, 200 tons, apartment building, Jackson Street, to McClintic-Marshall Co.

SANTA MONICA, CAL., 100 tons, Post Office, to Pacific Iron & Steel Co.

LOS ANGELES, 1100 tons, Truck Mirror building, to Consolidated Steel Corp.

Canada

CANADIAN PACIFIC RAILROAD, 1475 tons, bridge, for Moushield Division, to Bethlehem Steel Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

STATE OF NEW YORK, 300 tons, highway bridge, bids open Feb. 27.

ALBANY, N. Y., 5000 tons, prison building.

PHILADELPHIA, 2000 tons, section of Market Street subway, bids in March 16.

The South

HYMPTON, TEXAS, 500 tons, United States Government building.

NASHVILLE, TENN., 100 tons, Rhea County bridge for Tennessee Highway Commission.

MEMPHIS, TENN., 1500 tons, two car floats for Inland Waterways Corp., bids March 9.

PORT ARTHUR, TEX., 400 tons, sheet piling for Federal Government harbor works.

GALVESTON, TEX., 1000 tons, office building for Santa Fe Railroad.

BATON ROUGE, LA., 500 tons, bridges for Louisiana Highway Commission.

Central States

DETROIT, 130 tons, plant for bumper and frame division of Chevrolet Motor Co.

MUSKOGEE, MICH., 2000 tons, dock.

MUSKOGEE, 700 tons, dock for Sand Products Co.

LANSING, MICH., 1000 tons, bank and office building.

ALPENA, MICH., 1000 tons, wharfs for Thunder Bay Quarrier Co., subsidiary of Diamond Alkali Co.

CLEVELAND, 300 tons, two West Third Street bridges; bids to be taken March 6.

STATE OF OHIO, 500 tons, highway bridge.

CANTON, OHIO, 425 tons, building for Stark County Dry Goods Co.

AKRON, OHIO, 225 tons, building for Ohio Edison Public Service Co.

CLEVELAND, 100 tons, building for L. C. Hanna.

INDIANAPOLIS, 3000 tons, Indiana Bell Telephone Co. building.

SOUTH BEND, IND., 500 tons, Post Office.

STATE OF MINNESOTA, 300 tons, highway bridges.

ST. PAUL, MINN., 500 tons, First National Motor Ramp garage.

ST. LOUIS, 7000 tons, five approaches to municipal bridge; contracts let about April 5 by Board of Public Service.

ST. LOUIS, 600 tons, grain elevator for Missouri Pacific.

MILWAUKEE ROAD, 200 tons, bridge work.

Western States

SEATTLE, 300 tons, plates, 24 and 36-in. welded steel pipe; bids opened.

PORTLAND, ORE., 123 tons, bridge over Sauk River; bids Feb. 25.

DENVER, 250 tons, ring gates for Bureau of Reclamation; Consolidated Steel Corp., low bidder.

PHOENIX, ARIZ., 110 tons, bridge near Hackberry; bids opened.

SANTA ANA, CAL., 154 tons, subway; bids opened Feb. 24.

SAN DIEGO, CAL., 750 tons, ferry boat; bids opened.

SAN FRANCISCO, 111 tons, bridge in Yerba Buena County; bids March 10.

OAKLAND, CAL., 150 tons, pier, foot of Webster Street; California Steel Co., low bidder.

Railroad Equipment

Western Pacific Railroad has placed 2 locomotives with the Baldwin Locomotive Works.

Soviet Union has ordered 5 locomotives from the Baldwin Locomotive Works.

Southern District of Chicago has placed 29 air-dump cars with Ryan Car Co.

E. H. Wilson & Co., Philadelphia, are inquiring for 20 to 26 all-steel gondola cars.

Kansas City Southern is inquiring for four baggage and mail cars.

Baltimore & Ohio is in the market for five baggage and mail all-electric rail motor cars.

Northern Pacific is in the market for 200 motor cars.

Steel Buying by Automobile Companies

Largest Since September

DETROIT, Feb. 23.

THE automobile industry in the past week bought the largest tonnage of steel since last September. Following closely on purchases by Chevrolet were substantial specifications by Ford, Chrysler and several other makers. The most encouraging feature is that almost without exception the material is needed to cover immediate production requirements. One of the larger companies has requested delivery of sheets in a week, whereas ordinarily it gives mills about a month in which to fill its orders. Sheet and strip mills are feeling the best effects of this favorable turn in business. Demand for bars also has been exceptionally good.

The betterment in sheet bookings is not coming entirely from the automobile field, for electric refrigerator manufacturers have come into the market for fair-sized lots. Stove companies, which recently introduced new models, likewise are showing signs of recovery. The result of this buying movement is that the leading independent sheet producer is operating at the best rate in six months, the local sheet and strip mills are running on a highly satisfactory schedule, and Valley mills turning out light-rolled products have stepped up current programs. Unless it suffers an unexpected setback in the final week of the month, a prominent steel company will book about 20 per cent more business in this district in February than in January.

Ford Expanding Activities

AFTER several months of comparatively lean business, Ford is said to be expanding activities. In January it assembled 55,000 units, considerably less than the industry had anticipated. This month's performance may run as high as 80,000 to 85,000, although there is a strong possibility that it will not pass the 75,000 mark. A considerable acceleration in March is assured, with some talk that production may get back to 100,000. It is believed that the company's recent action in increasing dealers' discounts to a flat rate of 22 per cent has had a stimulating effect on retail sales.

As usual, there is a multitude of stories about a Ford eight and about resumption of work at the Highland

Automobile industry in past week bought the largest tonnage of steel since last September.

* * *

February automobile output in United States and Canada placed at 220,000 vehicles.

* * *

Ford made 55,000 cars in January. February assemblies expected to be 75,000 to 85,000; may reach 100,000 in March.

* * *

With Chevrolet, Buick and Cadillac holding up well and Pontiac-Oakland and Oldsmobile staging comebacks, General Motors is in stronger position than in 1930.

Park plant. Among the most fantastic, in which there is no truth, is that Ford is to be granted a five-year moratorium on taxes at Highland Park if it will reopen its factory there. With other automobile companies operating manufacturing establishments in that municipality and with industrial concerns outside the automobile business owning and running shops there, it is evident that favoritism on behalf of Ford would be impractical and probably illegal, no matter how strong the desire might be to induce it to return to its former home.

Chevrolet Holding to Program

CHEVROLET is holding to its plan of assembling some 67,000 cars this month, a slight decrease from January, largely on account of the fact that February is a short month. It will go back up to at least 70,000 in March. Buick is steady at 500 cars a day four days a week. Oldsmobile has surprised the trade with several upward revisions of production. Its February output is likely to be about 6000 cars. Oakland-Pontiac likewise has been compelled to enlarge its program and now is operating a second assembly line. This month's assemblies are put at over 10,000 cars, the March schedule probably will show 12,000 and April a like volume. During these three months, according to reliable reports, the company will turn out 6500 more cars than it had planned for. Five hundred more em-

ployees have been recalled, bringing the total working force up to 6200. Some of the departments are running night shifts. Cadillac also has gained the past week and is reported to be doing very well.

This recital of the present status of the various divisions of General Motors reveals that the corporation is in a much stronger position, so far as the popularity of its cars is concerned, than in 1930. Chevrolet got away to a flying start and in December passed Ford in national car registrations for the first time since the latter's model A got into production. In the first five months in which Chevrolet's 1931 models are being made, from November to March inclusive, it is fairly certain that total output will be in excess of 315,000 units. It must be remembered that this showing is in spite of the fact that three of the five months normally are dull. Perhaps just as gratifying an accomplishment as Chevrolet's is the comeback of Oakland-Pontiac and Oldsmobile, both of which fell by the wayside last year. It is generally acknowledged that Cadillac and Buick will maintain their positions. Under the circumstances, with the industry heading toward recovery, it would not be unusual if General Motors should earn considerably more this year than last, when it reported \$3.25 on its common shares.

Chrysler Doing Better

CHRYSLER has been forging to the front, its Dodge and Chrysler six jobs having taken well with the public. The Chrysler Imperial line also has been selling briskly, but, as it is a high-priced car, its production naturally is somewhat limited. DeSoto is said to have been moderately successful. After some weeks of fairly good production, Hudson has dropped off sharply and now is reputed to be running scarcely more than two days a week. Willys-Overland continues to disappoint with only 5000 jobs this month, thus paralleling January's record. Packard has been somewhat slow in showing a pickup. The new DeVaux six, equipped with Hayes body and Continental motor, is preparing for production of 2500 cars in March and 3000 in April at its Grand Rapids and Oakland, Cal., plants.

More than 800 Marmons in the '70'

series were turned out in January. Work on the Marmon 80 will begin this week, to be followed by the 16-cylinder car early in March. Reo's schedule of about 50 cars a day has not changed. Hupmobile is doing a little better. Studebaker and Nash are reported to be gaining slightly. Auburn is attempting to augment its activities so as to reach the February goal of more than 4600 cars. Its deliveries this year are ahead of those in 1929, a record year.

Workers' Earnings Decline Sharply

THE most significant testimony regarding the reduced income of workers in the automobile industry comes in the form of a report by the Michigan State Department of Labor. Forty-two automobile manufacturers in Michigan employed 147,715 men in January, against 149,582 in December and 197,889 in January, 1930. Offhand, the reduction in number of employees from December to January was not large, but the decline in average weekly earnings per capita was little short of alarming, indicating fewer man-hours worked. In January they were \$14.42 as against \$25.60 in December and \$24.33 in January, 1930.

Steel Buying Expected to Gain

STEEL people are asking each other whether current business placed by the automobile industry is the outcome of a temporary situation or is likely to be sustained in the coming weeks. Chances favor a continuation of good bookings, as automobile factories are just getting into what normally is their best season of the year. Executives agree that March, April and May, usually the peak months, should show substantial gains and that May probably will not be the biggest month in 1931, but that the best period may be June or even later. In fact, if the industry is to come anywhere near the conservative prediction of four million cars this year, it must take big strides in the weeks just ahead. With some factors pointing to such an increase, it is reasonable to expect that the steel industry will be the recipient of a good volume of business from automobile makers. Inventories of both automobile plants and parts manufacturers are so low that business which they take will be instantly reflected in steel specifications.

The Great Lakes Steel Corp. is expected to take off one or two open-hearth for relining shortly. These two have been running since late last summer. There is some talk about the Monroe, Mich., sheet mill of the Newton Steel Co. resuming operations, but no definite information is available.

THE action of the Canadian Government in increasing the tariff on automobiles will be beneficial to those American companies having Canadian plants. It is anticipated that this will

JANUARY AUTOMOBILE OUTPUT 171,903 UNITS, UP 10½ PER CENT

Washington, Feb. 24.—Production of motor vehicles in the United States rose to 171,903 units in January, against 155,700 in December, according to the Bureau of the Census, a gain of about 10½ per cent.

Canadian output increased to 6496 in January from 5622 in December.

give renewed vigor to the industry in the Windsor-Walkerville district across from Detroit, thus providing employment for hundreds, perhaps thousands now idle.

Wilson-Brown, Inc., Agent for Sellers Tools

Wilson-Brown, Inc., 30 Church Street, New York, has been appointed dealer agent in the New York territory by William Sellers & Co., Inc., Philadelphia machine tool manufacturer. The Sellers company has not heretofore been represented in the New York district by a dealer, having handled its sales from its home office. Wilson-Brown, Inc., will also distribute the new Regal line of small lathes, the product of the R. K. Le Blond Machine Tool Co., Cincinnati. The Le Blond company is now appointing agents throughout the country for the Regal lathes.

Canadian Pig Iron Output Down, Steel Up

Toronto, Feb. 24.—January pig iron production in Canada amounted to 35,592 gross tons, a decline of 7 per cent from the 38,293 tons reported for December, and less than half the 87,079 tons made in January, 1930. The recession from the previous month, was due to the decline in the output of foundry iron from 17,551 tons in December to 4711 tons in January and in basic iron, which fell from 20,116 tons to 18,966 tons. These losses were offset somewhat by an increase in the production of malleable iron to 11,915 tons, compared with 626 tons in December.

On Jan. 31, three furnaces were in blast as follows: Dominion Steel & Coal Co., one; Steel Co. of Canada, Ltd., Hamilton, Ont., one; Algoma Steel Corp., Sault Ste. Marie, Ont., one. The latter company blew in a

second furnace on Feb. 10, making four stacks now active.

Production of ferroalloys totaled 1467 tons in January, an increase of 27 per cent over the 3530 tons of December.

A gain of 3 per cent in the output of steel ingots and direct steel castings was reported. Production for January was 57,598 tons, compared with 56,101 tons in the previous month and 115,200 tons in January, 1930.

Freight Rate Decisions on Iron and Steel Scrap

WASHINGTON, Feb. 24.—Rates on scrap iron and steel from Chicago and Milwaukee to New Orleans, La., 35.5c. and 40.5c. a 100 lb. respectively, will be reduced to the level of rates on the same products from New Orleans to Chicago and Milwaukee, 30.5c. and 32.5c., respectively, if the Interstate Commerce Commission approves recommendations made by Examiner Leland F. James. The examiner's finding was based on a complaint by Dibert, Bancroft & Ross Co., Ltd., operating an electric steel foundry in New Orleans. The report also recommended payment of reparation.

Passing upon a number of complaints, Examiner Harris Fleming recommended that rates on scrap iron and steel from various points on the Chesapeake & Ohio Railroad to Staunton, Va., Ashland, Ky., and New Boston and Portsmouth, Ohio, be established on the basis of 70 per cent of the basic scale in the general iron and steel rate case. This is the basis of rates prescribed for central territory in the Continental Steel Co. case.

Examiner Fleming recommended that the rate of \$6.31 a gross ton on scrap from Danville, Va., to Ashland, Ky., be reduced to \$5.37. The rates dealt with were held not to be unreasonable in the past with the result that reparation was not recommended. The proposed scale would mean a reduction in rates.

Tabor Mfg. Co. Buys Titgen-Eastwood Co.

The Tabor Mfg. Co., Tacony, Philadelphia, has purchased the Titgen-Eastwood Co., also of Philadelphia, which for years has been manufacturing a complete line of foundry equipment, including cupolas, sand blast equipment, furnaces, tumbling barrels, pressure blowers, dust collectors and core room accessories, in addition to repairs and parts for the foundry equipment formerly sold by the J. W. Paxson Co., Philadelphia.

The Titgen-Eastwood line, supplementing the Tabor molding machines, will give the Tabor Mfg. Co. a well rounded line of foundry equipment. The Tabor company will continue to furnish repairs and parts for the Paxson line of foundry equipment.

PERSONALS

MYRON E. FORBES, formerly president of the Pierce-Arrow Motor Car Co., has been appointed vice-president in charge of financial matters of the Oliver Farm Equipment Co. Prior to being president of the Pierce-Arrow company, Mr. Forbes was associated in various executive capacities with Deere & Co., whom he left on a leave of absence in 1918 to supervise the management of munition manufacture in a Dayton, Ohio, plant.

H. M. LUCAS, president, Lucas Machine Tool Co., Cleveland, has been elected president of the Associated Industries of that city. THOMAS FERRY, president, Ferry Cap & Set Screw Co., was named vice-president and Walter L. Seelbach, secretary and treasurer of Forest City Foundries Co., was named treasurer.

MYRON C. TAYLOR, chairman of the finance committee of the United States Steel Corp., has been elected president of the New York Genealogical and Biographical Society.

J. M. MCNEAL, European sales manager, with headquarters in Birmingham, England, for the Landis Machine Co., Waynesboro, Pa., sailed on Feb. 14 for England, after a three weeks' visit to the home office.

F. C. ENGELHART, who has been general manager and treasurer of the Kester Solder Co., Chicago, has been made president. J. A. REITZEL, formerly sales promotion manager, succeeds him as general sales manager.

ERNEST H. DU VIVIER, of 30 Church Street, New York, has been appointed representative in metropolitan New York and northern New Jersey by the Illinois Testing Laboratories, Inc., Chicago, and F. W. FERNALD has become the company's representative in western Pennsylvania and West Virginia, with headquarters at 235 Fifth Avenue, Pittsburgh.

E. W. STEGMAN is managing the Monarch Machinery Co., 300 North Third Street, Philadelphia, following the recent death of its owner, E. R. Mack. Mr. Stegman has been with the company 20 years.

RUSSELL GOLDSMITH, formerly Boston manager of the Genfire Steel Co., and J. A. O'LEARY, former sales engineer, have become associated with the Milnor Steel Co. in the same respective positions.

HENRY L. ERLEWINE, president and general manager of the Marion Machine Foundry Co., Marion, Ind., has been elected president of the City Planning Commission.

W. G. JONES, president, W. A. Jones Foundry & Machine Co., Chicago, has sailed for the Orient, where he will spend three months.

ORLAND F. BAUGHMAN has been elected president of the Dickey-Grabler Co., Cleveland maker of metal stampings, to fill the vacancy caused by the death of Albert H. Dickey. HARRY RIDER has succeeded Mr. Baughman as vice-president.

E. A. EMERSON, who has been engaged in export work for the American Rolling Mill Co., Middletown, Ohio, since 1912, has been elected



E. A. Emerson

president of the Armes International Corp. He joined the company as a vacation worker in 1904 and, upon graduation from Cornell University in 1910, became a member of the research staff. When the company decided to develop foreign markets, Mr. Emerson was sent to Brazil, where he opened the company's first branch export office in Rio de Janeiro.

American Steel Co. Plant to Be Sold at Auction

The Industrial Plants Corp., Columbian Building, Columbus, Ohio, on March 17, will sell in Terre Haute, Ind., at public auction, the plant, machinery, equipment, land, etc., of the American Steel Co. of Indiana. The sale is to be held by order of the Superior Court of Vigo County, Indiana.

The American Steel Co. of Indiana has been in receivership for some time. Samuel C. McKean, president of the First McKean National Bank, Terre Haute, who was appointed receiver, endeavored to bring about a reorganization. His efforts were unsuccessful due to the depression in the steel industry, with the result that the plant will now be sold for dismantling. The American Steel Co.'s equipment includes two 20-ton open-hearth furnaces and rolling mill equipment for the manufacture of concrete reinforcing bars.



NEW vice-presidents of the McClintic-Marshall Corp. Elbert A. Gibbs is in charge of operations, C. M. Denise, in charge of sales, and E. J. Patterson is vice-president and treasurer. Announcement of their appointment was made in these columns last week.

▲ ▲ ▲ OBITUARY ▲ ▲ ▲

ALEXANDER LUCHARS, president, Industrial Press and publisher of *Machinery*, died of pneumonia on Feb. 19, at his home in Upper Montclair, N. J. He was born at Quincy, Mass., Feb. 10, 1854, and for 37 years had been the publisher of *Machinery*, which journal he founded in 1894. Mr. Luchars was educated at the Chauncy Hall School, Boston, Mass., and at the Massachusetts Institute of Technology, where he took a course in architecture. After having been engaged for some years in an architect's office in Boston, he left this work to engage in publishing, establishing himself in this field in New York in 1889, where he founded the Industrial Press. In 1919 the Secretary of Commerce appointed Mr. Luchars to study the machinery markets in Europe. He was at one time governor of the Machinery Club of New York.

WILLIAM J. EVANS, for 17 years identified with the Titanium Alloy Mfg. Co., Niagara Falls, N. Y., died at St. Margaret's Hospital in Pittsburgh, on Jan. 27, aged 70 years. Mr. Evans entered the steel business with Lloyds in England 50 years ago. After coming to America in 1888, he was for 19 years at the Park Works of the Crucible Steel Co. of America as superintendent of the open-hearth and for six years was with the Alan Wood Steel Co., Conshohocken, Pa. At the time of his death, Mr. Evans was district agent of the Titanium Alloy Mfg. Co. in Pittsburgh.

GEORGE H. FRIESEL, treasurer, auditor and a director of the United Engineering & Foundry Co., Pittsburgh, died on Feb. 22, at Johns Hopkins Hospital, Baltimore, after an operation. Except for a period of about two years, he had been identified with the United company since 1905. His death is the third in the past two months among the officials of

the company, Isaac W. Frank, chairman, having died early last December and William Gardner, first vice-president, on Dec. 28. Mr. Friesel was born in Pittsburgh on Feb. 25, 1889. He was first employed in the Frank-Kneeland department in the accounting division. Early in 1914 he left the company to take charge of cost accounting for the Best Mfg. Co., Oakmont, Pa., and late in 1915 severed that connection to become secretary to the manager of ordnance, Poole Engineering & Machine Co., Baltimore. In October, 1916, he rejoined the United company as chief clerk of the chilled roll foundry department, Vandergrift, Pa. In 1918, he was elected auditor of the company and in 1923 assumed the additional office of treasurer.

CLINTON SUMNER BRADLEY, general manager of sales for the Jones & Laughlin Steel Corp., Pittsburgh, died at his home in that city on Feb. 18, aged 57 years. He had been identified with the Jones & Laughlin company for 28 years, and, as manager of sales for the last six years, had been widely known and favorably regarded throughout the entire steel industry. Mr. Bradley was born at Omaha, Neb., but moved to Akron, Ohio, where he received his formal education. His first connection in the iron and steel business was with the Akron Iron Co., which he served in a sales capacity first in Boston and later in Chicago. Leaving that company in 1897, he became affiliated with the Whitman & Barnes Mfg. Co., which he represented in New England as special agent until 1899. For the next four years he was vice-president in charge of sales of the Sterling Copper Co., Chicago, and then went with the Jones & Laughlin Corp., in its New York office, becoming reassociated with H. F. Holway, who was head of the Akron

Iron Co. before appointment as New York district sales manager of the Jones & Laughlin Steel Corp. Mr. Bradley was made Buffalo district sales manager in 1906 and held that position until October, 1923, when he was transferred to Pittsburgh and made manager of sales in the hot-rolled department. He was promoted to his recent position on Jan. 1, 1925.

ROBERT A. MCKEAN, vice-president of the McClintic-Marshall Co., Pittsburgh, died at his home in that city on Feb. 19, aged 67 years. He was born near the present town of Charleroi, Pa., and attended the Pittsburgh schools and the Western University of Pennsylvania, now the University of Pittsburgh. Following his graduation from that institution in 1886 as a civil engineer, he went with the Ritter-Conley Co., Pittsburgh, as a structural engineer. In 1908 he was made manager of the Keystone plant of the Jones & Laughlin Steel Corp., but left this position in 1916 to become general manager of the Ritter-Conley plant of the McClintic-Marshall Co. at Leetsdale, Pa.

He was later promoted to the position he held at the time of his death. Mr. McKean had spent considerable time in Europe engaged in construction work for the Ritter-Conley Co. and in this country was responsible for the construction of the blast furnaces of the Illinois Steel Co. at Gary, Ind.; those of the Jones & Laughlin company at Aliquippa, Pa., and the Pueblo, Colo., stacks of the Colorado Fuel & Iron Co. He was also instrumental in the construction of towers for the first high-tension transmission lines erected in the United States.

WINFIELD S. ROGERS, one of the country's pioneer manufacturers of ball bearings, died at his home in South Orange, N. J., Feb. 18, aged 77 years. He began the manufacture of bearings more than 30 years ago and supplied many automobile companies when that industry was in its inventive stage. Previously he was identified with the machine tool industry at Cincinnati and was also engaged at the Watervliet, N. Y., arsenal as a mechanical engineer, designing 8, 10 and 12-in. guns for the army. He retired as president of the Bantam Ball Bearing Co., Bantam, Conn., two years ago.

L. R. ZIFFERER, president of the Columbia Malleable Castings Corp., Columbia, Pa., died of pneumonia in that city on Feb. 19, aged 44 years. Prior to 1917, Mr. Zifferer, who was the inventor of new types of expansion bolts, operated the United States Expansion Bolt Co. Because of his inability in the war years to get an adequate supply of malleable castings he bought and modernized the plant of George P. Cooper & Co., at Columbia and changed the name to the Columbia Malleable Castings Corp.



Alexander Luchars



W. J. Evans



G. H. Friesel

California Industry Hopeful

Pacific Coast Iron and Steel Men
Hold Conference at Del Monte

OPTIMISM for the immediate future of the steel industry on the Pacific Coast was the keynote of the seventh annual conference of the Iron, Steel and Allied Industries of California, held under the auspices of the California State Chamber of Commerce, at Del Monte, Cal., Feb. 12 to 14.

Features of the convention included addresses by Charles F. Abbott, executive director, American Institute of Steel Construction, New York, and E. O. Schreve, assistant vice-president, General Electric Co., Schenectady, N. Y. Resolutions were adopted pledging the conference to further extend its program for the development of industry in the West. R. M. Alvord, General Electric Co., San Francisco, was elected chairman for the coming year, succeeding J. E. Webster, Southwestern Engineering Co., Los Angeles, who had presided for the past two years.

A recommendation was made that the building code committee of the California State Chamber of Commerce be requested to have provision made in the uniform building code, California edition, to cover the use of 27½-in. corrugated or 30-in. flat sheets as standard for California.

Evidences of Industrial Expansion

J. E. Webster, chairman, in calling the conference to order, outlined what had been accomplished during 1930 and cited the expansion of the two major steel producing companies on the coast, the Columbia Steel Corp. and the Pacific Coast Steel Corp., as promises of increased employment and prosperity. He also cited instances of new industries impending, including the Ford Motor Co. plants at Long Beach and Richmond, Cal., and Seattle, Wash.

C. J. Struble, president, Oakland Chamber of Commerce, pleaded for greater and closer cooperation among the individual members comprising an industry. He pointed to the title insurance business in California as an outstanding example of what an industry could accomplish in the way of stabilization of prices by constructive cooperation. "This industry a few years ago," he said, "was in the throes of a price cutting orgy that threatened ultimate bankruptcy. By cooperation, in the fullest sense of the word, it succeeded in raising the standard of service, regained the confidence of the public and has placed the industry on a basis where commensurate profits are being enjoyed by all concerned."

In speaking on "Natural Gas a Factor in the Steel Industry," R. E.

Fisher, vice-president, Pacific Gas & Electric Co., San Francisco, traced the development of the industry and pointed out the steps being taken to conserve this national resource. He said: "California can look forward to years of abundant and cheap fuel from the natural gas fields of the State despite the ever increasing use of gas in manufacturing products of all sorts."

Unlawful Price Cutting Condemned

Charles F. Abbott said, in his address on "Profits in Cooperation," "American industries have cooperated to effect economies through standardization and the elimination of waste, and it is now imperative that they cooperate to eliminate unprofitable operation. Trade associations are today confronted with a distinct duty: they must recognize that the whole structure of business is based upon profit and not upon the mere production or exchange of commodities."

"It is not the lawful reduction of prices that I condemn. We must recognize the ethical distinction between necessary price reductions and price cutting which is inspired by a selfish desire to obtain more than a reasonable proportion of business."

"Prices that are reduced to dispose of excess inventories or to meet emergency conditions confronting a producer would not, and should not, be classified as illegal price cutting. On the other hand, prices that are cut for the purpose of taking business away from others who may be entitled to it is an objectionable form of price cutting. Under the spirit of the Clayton Act such practices, I firmly believe, are illegal."

"The Clayton Act plainly condemns price discriminations which are designed for the purpose of lessening competition. The idea behind the Federal law is in line with what we all believe in, and I feel confident that we could cure the evils of price cutting today were we not likely to lose our way in the morass of legal technicality that so often follows when we depend entirely upon the courts to correct economic evils."

Variety of Subjects Discussed

The following also addressed the conference: Lieut.-Col. Le Roy F. Smith, Better American Federation, Los Angeles, on "Americanization"; W. A. Chown, California Inspection Rating Bureau, San Francisco, on "Safety Standards and Their Relation to Compensation Insurance"; Will H. Fischer, vice-president, Southern California Edison Co., Los Angeles, "The Power Industry and Manufacturing in

California"; Walter A. Schmidt, president, Western Precipitation Co., Los Angeles, "Worldwide Industrial Competition"; Frederick L. Lipman, president, Wells Fargo Bank & Union Trust Co., San Francisco, "Industrial Financing"; Joseph Thompson, president, Pacific Electric Mfg. Co., San Francisco, "A Typical Development of an Industry in California"; J. A. H. Kerr, president, Los Angeles Chamber of Commerce, and Leland W. Cutler, president, San Francisco Chamber of Commerce, "The Iron and Steel Industry," and Arthur Fisher, Butler, Lamb, Foster & Pope, counsel for the Concrete Reinforcing Steel Institute, Chicago, "Practical Application of Trade Practice Rules."

The executive committee met at a special dinner the evening of Feb. 13, at which time the new chairman, R. M. Alvord, was elected and also the vice-chairman and secretary, namely, E. Jungquist, Perceval Steel & Supply Co., Los Angeles, and Charles S. Knight, director industrial department, California State Chamber of Commerce, respectively.

The eighth annual conference will be held in Santa Barbara, Cal., Feb. 11 to 13, 1932.

Chairmen of group committee for the northern and southern sections were appointed as follows:

NORTHERN CALIFORNIA

Structural Steel

1. E. Hibbs, J. J. Hibbs, Pacific Coast Steel Co., San Francisco

Purchasing Agents

Robert Meigs, Motion Navigation Co., San Francisco

Merchant Steel Dealers

2. S. Thayer, Dunham, Carrigan & Hedges, San Francisco

Foundries

3. T. Hoch, Enterprise Foundry Co., San Francisco

Manufacturers

4. H. Peillon, Western Pipe & Steel Co., San Francisco

Reinforcing Steel Dealers

Charles M. Gann, Gann, Calk & Co., San Francisco

Steel Mills

William A. Ross, Columbia Steel Corp., San Francisco

Traffic

Harry Hofmann, Baker, Hamilton & Pacific Co., San Francisco

SOUTHERN CALIFORNIA

Structural Steel

1. D. Gold, McClintic-Marshall Co., Los Angeles

Purchasing Agents

2. F. Watkins, Southern California Edison Co., Los Angeles

Merchant Steel Dealers

3. Jungquist, Perceval Steel & Supply Co., Los Angeles

Foundries

4. H. Tibbets, Los Angeles Steel Casting Co., Los Angeles

Manufacturers

George J. Roberts, Jr., Standard Boiler & Steel Works, Los Angeles

Reinforcing Steel Dealers

5. E. Dawson, Soule Steel Co., Los Angeles

Steel Mills

Arnold Foster, Pacific Coast Steel Corp., San Francisco

Traffic

T. A. L. Loretz, Consolidated Steel Corp., Los Angeles

Machine Tool Business Slow and Spotty

Improvement Noticed
in January Not Gathering
Momentum—Some Markets Dull

MACHINE tool business, which had a spotty improvement in January, has not gathered momentum. Although some sellers who experienced a fairly good pickup in orders last month are doing as well this month, it is probable that they will not be able to show an increase.

Cleveland reports that February may show a gain for some sellers, but elsewhere this month will not be materially better than last.

At Chicago, two Western railroads which had been counted upon to buy soon against recent sizable lists, are said to be scaling down requirements.

A Cincinnati manufacturer has had orders for about 50 small lathes, but demand upon the Cincinnati tool builders generally is not good and has not improved much this year.

Inquiries in all markets show a fair degree of promise, but prospective buyers are still slow to close.

increase in the number of inquiries. For most tool builders, February bookings thus far represent a moderate increase over those of January. The fact that more users are inclined to enlarge shops is considered a favorable sign. Few of these extensions, however, are of major importance so far as the need for lists of new equipment is concerned, but they will impart at least a small substance to the market volume. The gradual upturn in the employment curve continues. Generally speaking, however, increase in production schedules is represented by giving employees more hours of work.

New York

Some machine tool houses in New York continue to report a fairly good volume of orders, comparable with the average for January, which month was the best since the first half of 1930 for several in the trade. Indications are, however, that February sales will no more than equal those of January. If business is rising in volume, the gain is so small as to be barely noticeable. The New England territory is more active than other sections of the East.

Washington

The Bureau of Supplies and Accounts of the Navy Department has issued specifications inviting bids for a number of machine tools on Feb. 24 and March 3, 10 and 17. Bids are to be based on deliveries indicated as follows:

Feb. 24.—Two flatstone water-cooled mills in tandem, Portsmouth, Va., Navy Yard; two motor-driven 30-in. x 3-in. high-speed snagging grinders, Philadelphia Navy Yard.

March 3.—Motor-driven universal milling machine, Naval Air Station, San Diego, Cal.; motor-driven shaper, Naval Air Station, San Diego; motor-driven hack saw, Naval Air Station, San Diego; motor-driven sheet metal cutting machine, Naval Air Station, Seattle, Wash.

March 10.—Motor-driven, 14-in. x 6-ft. engine lathe, Mare Island, Cal., Navy Yard; motor-driven crank shaper, naval operating base, Hampton Roads, Va.; 16-in. x 10-ft. engine lathe, Mare Island; motor-driven, 24-in. vertical turret lathe, naval operating base, Hampton Roads; motor-

driven bending roll machine, Philadelphia Navy Yard; electric spot welder, Portsmouth, Va., Navy Yard; transverse tensile testing compression bending machine, Bremerton, Wash., Navy Yard; motor-driven universal tool grinder, Mare Island; motor-driven bending machine, Hampton Roads or f. a. s. vessel, San Francisco; motor-driven sensitive bench drill, Hampton Roads or f. a. s. vessel, San Francisco; motor-driven, self-contained, quick-change gear screw cutting lathe, Naval Air Station, Seattle; motor-driven engraving machine, Mare Island; automatic magnetic grinding and polishing machine, Boston Navy Yard; motor-driven shaper, Naval Air Station, Seattle; motor-driven cutter, reamer and drill grinder, Naval Air Station, Seattle.

March 17.—Motor-driven, ball-bearing band saw, Naval Air Station, Seattle.

New England

There is no particular change so far as dealers are concerned. The consensus now is that a buying movement will not get under way for at least a month. New England makers of tools report slightly more doing, although plant operations have not been stepped up much, if any. The Hendey Machine Co., Torrington, Conn., has resumed operations with approximately 100 employees and 80 more have been recalled. Operations are on a 45-hr. per week schedule.

Milwaukee

Machine tool business is making some headway in the face of general business apathy, judging by the steady

Chicago

Recent news as to probable railroad requirements is now somewhat tempered by reports that both the Santa Fe and the Chicago Great Western, the only two Western railroads to issue sizable lists so far this year, are rather sharply scaling down their stated needs. On the other hand, the Union Pacific is in the market for a motor-driven rail saw and the Burlington is asking for a No. 3 cutter and reamer grinder and a 5-ft. radial drill, the latter being an alternate on a request for a 7-ft. radial drill on which figures were taken last December.

Machine tool business as a whole has shown little change throughout February. Slight gains in some directions have been offset by downward movements in other directions. Few unsolicited inquiries come through the mails.

Cincinnati

While current demand for machine tools in this district continues to be sluggish, a substantial amount of business is now pending, and builders indicate that if this business is closed before the end of February, the month will show an increase over January. The feeling in the market seems to be more optimistic than heretofore, as builders give what they believe to be a factual basis for their optimism.

Inquiry continues to be good, although operations of district plants are still low. A local manufacturer of lathes reports the receipt of an order for 50 small lathes from a Western user. These lathes ranged in size from 10 to 18 in. An inquiry from the Amtorg Trading Corp., New York,

which has been pending for some time, is expected to be closed soon.

Pittsburgh

The machine tool market in this district continues to show some signs of improvement, but orders this month have failed to show a substantial gain over the very low January rate. New inquiry is still coming out in fair volume and in many cases immediate action is urged. Demand for repair parts continues heavy, and many buyers seem to be making old equipment stand up as long as possible. This also brings considerable work to local offices and all of them are busy, even though the business is of a minor sort. Makers of heavy machinery and equipment are still fairly busy, but no new orders have been placed recently. Crane builders are reaching the end of their order books, with new awards confined principally to single units.

Cleveland

While machine tool sales and inquiries are still light, the volume of business during February will show a moderate gain over that of January. Orders are limited to single machines and are coming from scattered sources. There is a scarcity of orders from the motor car industry, while no business is coming from the railroads. The National Tube Co. is inquiring for

two large turret lathes for its Lorain, Ohio, plant, and an inquiry for three large machines, involving \$25,000, is pending from a northern Ohio metal-working plant.

New York

CONSIDERABLE part of former ship-building plant of Samuel L. Moore Sons Corp., Elizabeth, N. J., more recently owned by Bethlehem Steel Co., has been acquired by Pure Carbonic Ice Corp., care of Abraham Goldstein, 645 West 160th Street, New York, president, organized to manufacture a product under a special process, resembling dry ice. New owner expects to have plant ready for service in April. Col. James H. Hayes is secretary.

Consolidated Gas Co., 4 Irving Place, New York, has plans for a multi-story equipment, repair and service shop at 500 East Sixty-third Street, to cost over \$200,000 with equipment. J. P. Hunter is company architect, address noted.

General Metal Box Corp., Brooklyn, has been organized with capital of \$20,000 to take over and expand General Metal Box Co., with local plant at 269 North Eleventh Street. A. M. Bakerman and Harry H. Glegg are incorporators of new organization.

American Colortype Co., 267 West Twenty-fifth Street, New York, has purchased textile plant of Brighton Mills, Allwood, N. J., consisting of 32 acres improved with one-story building totaling 250,000 sq. ft. floor space. Purchasing

company will consolidate a number of subsidiaries at new location, including Gotham Process Lithographing Co., Samuel Gabriel & Sons Co., and Meeble Lithographing Co., as well as part of plant of Osborne Co., 753 Summer Avenue, Newark.

Al Williams, Inc., New York, care of Carroll B. Low, 420 Lexington Avenue, attorney, is planning establishment of new plant near city for production of high-speed aircraft, including parts manufacture and assembling. Company is headed by Alford J. Williams.

American Agricultural Chemical Co., 420 Lexington Avenue, New York, has purchased property fronting on Mississippi River at St. Paul, Minn., and is considering new branch plant at that location.

Westinghouse Electric Supply Co., 100 Broadway, New York, a subsidiary of Westinghouse Electric & Mfg. Co., has acquired Hessel & Hoppen Co., 240 Cedar Street, New Haven, Conn., electrical equipment and supplies, and will operate as an affiliated interest.

Art Metal Die Manufacturers, 118 West Twenty-fifth Street, New York, have leased space in building at 133-35 West Twenty-fifth Street, for expansion.

Department of Parks, Arsenal, Central Park, New York, has plans for automobile service, repair and garage building in Bronx, to cost over \$100,000 with equipment. Joseph Dusenbury, 2382 Grand Concourse, is architect.

Walker-Turner Co., 66 York Street, Jersey City, N. J., manufacturer of tools, hardware, etc., has purchased former

INDUSTRIAL CONSTRUCTION

Railroad Improvements Announced During Past Week Exceed Half Billion Dollars

RAILROADS come to the front this week in the news of forthcoming construction. Hitherto this year they have been relegated to a minor position, with public utility improvement and extension projects consistently holding the center of the stage week after week.

Improvements by the New York Central Railroad in the west side tracks will cost \$150,000,000 and will extend over the next four years. Other improvements, including the elimination of grade crossings at Syracuse, N. Y., and elsewhere on that line will bring the Central's budget up to \$250,000,000.

Pennsylvania Railroad Co. will spend \$175,000,000 during the next 30 months, largely in the extension of electrification. The program includes the purchase of 240 electric locomotives.

Baltimore & Ohio Railroad will make extensions and improvements to its lines and shops which will aggregate \$35,000,000. Of this, close to \$4,000,000 will be spent for new equipment.

The Erie, Pere Marquette, Nickel Plate and Chesapeake & Ohio, all of the Van Sweringen system in the East, will aggregate \$100,000,000 in con-

struction and improvement expenditures during this year.

The total of the budgeted projects announced above is \$560,000,000. Some of this is represented by work that will run for from two to four years.

Current projects in industrial construction announced during the week, which will require machinery and equipment in their completion, are as follows:

Public utilities and power plants	\$2,616,000
Industrial plants	3,470,000
Metal-working plants	1,190,000
Railroad improvements	145,000
Municipal improvements, airports, etc.	805,000
Total	\$11,226,000

*Exclusive of the projects mentioned above.

In addition to these, new school projects announced during the week amount to \$2,760,000 and projects covering the improvement or extension of public utility company properties aggregate \$17,500,000.

Notable among the week's metal-working projects is the item of \$3,000,000 for an assembly plant to be erected in Seattle for the Ford Motor Co.

plant of Samuel W. Rushmore, Plainfield, N. J., consisting of main building, 180 x 275 ft., three stories, and adjoining one-story units, including foundry, for new plant. Alterations will be made to cost about \$25,000, and present works will be removed to new location.

Dugan Brothers, Inc., 161 Algonquin Avenue, Newark, Ind., has plans for a one-story automobile service, repair and storage building, 200 x 250 ft., at Clinton, N. J., to cost about \$125,000 with equipment. Henry Hender, 212 Franklin Avenue, Brooklyn, N. Y., is architect.

Standard Oil Co. of New York, Inc., 26 Broadway, New York, plans building out of Eagle Works at Avenue C, N. J., including oil storage and distributing unit, recently partly destroyed by fire. W. W. Brando is plant manager.

Board of Education, Westwood, N. J., is considering installation of manual training school of 10 new two-story and one-story buildings to cost \$200,000, including work on existing buildings and grounds. Arthur M. Fox, State Bank & Trust Building, Hackensack, N. J., is architect.

S. A. & Son, 1111 E. 1st St., Ashbury Park, N. J., will build new first floor and second floor of 85,572 sq. ft. in plant at 1111 E. 1st St. for extension of power plant.

W. L. Burrows Co., Inc., 1000 Broadway, New York, has plans for a new building at 1000 Broadway, New York, N. Y.

South Atlantic

PLANS have been authorized by City Council, Martinsville, Va., for a new power plant, to cost about \$100,000 with equipment. Saxton & Williamson, Inc., 1000 Broadway, Richmond, Va., is engineer.

Baltimore & Ohio Railroad Co., Baltimore and Charles Streets, Baltimore, is planning a new building at 1000 Broadway, New York, N. Y.

Bureau of Yards and Docks, Navy Department, Washington, will soon call for bids for following work authorized in emergency construction program: Improvements in boiler shop facilities to cost \$150,000, and extensions in wood-working shop to cost \$150,000 at Norfolk, Va.; Navy Yard, extensions and alterations in power plant and heating system at Washington yard to cost \$25,000 and \$20,000, respectively; power plant equipment and other work at Quantico, Va.; marine barracks, \$100,000; extension of harbor and ship building at Naval Air Station, Hampton Roads, Va., to cost \$750,000.

J. P. Harty & Sons, 1111 E. 1st St., Ashbury Park, N. J., will build new first floor and second floor of 85,572 sq. ft. in plant at 1111 E. 1st St. for extension of power plant.

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Standard Oil Co. of New York, Inc., 26 Broadway, New York, plans building out of Eagle Works at Avenue C, N. J., including oil storage and distributing unit, recently partly destroyed by fire. W. W. Brando is plant manager.

chine, and until March 17 for one brake testing machine.

Roanoke Gas Light Co., Roanoke, Va., is arranging for expansion and improvements to cost about \$90,000, including extensions in artificial gas plant with new screening equipment, coke crusher and necessary equipment, line extensions, etc. Company is a unit of Central Public Service Corp., 105 West Adams Street, Chicago. W. J. McCorkindale is local manager.

McLaren Rubber Co., Charlotte, N. C., manufacturer of automobile tires, etc., recently reorganized, has increased capital from \$500,000 to \$600,000 and 20,000 shares common stock, no par value, to \$200,000 shares. Company is considering new stock issue to total about \$500,000, part of fund to be used for expansion in production. I. McShroun is vice-president and general manager.

Columbian Paper Co., Buena Vista, Va., is completing plans and placing award-winning equipment for new steam-powered electric power house at Bristol, Va., to cost over \$50,000 with machinery. It is expected to place general contract in March. W. E. Biggs Engineering Co., 1000 Broadway, New York, N. Y., is engineer.

A. J. Burrows Co., Inc., 1000 Broadway, New York, has plans for a new building at 1000 Broadway, New York, N. Y.

Buffalo

PLANS are under way by Board of Trustees, University of Buffalo, Niagara Square, Buffalo, for new steam power plant for central heating, to cost over \$85,000 with equipment. Green & Hopkins, Niagara Square Building, architects; J. W. Danforth Co., 1111 E. 1st St., is engineer.

Titanium Alloy Mfg. Co., Niagara Falls, N. Y., is planning early removal of present plant to 80 tons, where building has been required. Alloy manufacturing plant will be continued at Niagara Falls.

George J. and Frank Foster, 1000 Broadway, New York, N. Y., have organized Thermo-Trol Corp., with capital of \$50,000, and will operate first plant for manufacture of scientific instruments. George F. Triggs, 111 Washington Street, is also interested in new company.

New York State Electric & Gas Corp., Albany, N. Y., has applied for permission to issue bonds in amount of \$7,000,000, part of fund to be used for extensions and improvements in plants and systems. Company has recently secured authority to take over and expand properties of Edison and Rockport.

Officials of J. P. Lewis Co., Beaver Falls, N. Y., have acquired a controlling interest in Lewis, Shuman & LeFevre Co., Inc., operating a steel pipe and paper mill. Acquiring company specializing in production of tube board stock, etc., will continue operation of purchased company and a new company development of electric power plants for operation of tube mills. Power properties are operated in water of Beaver River Power Corp., an affiliated interest.

New England

CONSTRUCTION program of Navy Department, under direction of Bureau of Yards and Docks, Washington, will include extensions and improvements in electric system at Boston Navy Yard to cost \$150,000, also crane facilities and marine railway, to cost \$50,000. New buildings will be extended at Portsmouth, N. H., yard, to cost \$35,000 and \$50,000, respectively; extensions and improvements in power plant and steam system at naval training station, Rhode Island, \$50,000; new building at submarine base, New London, Conn., to replace building No. 42, damaged by fire, \$50,000. Bids will be asked soon.

Union Screen Co., 206 Carpenter Street, Providence, R. I., has leased floor in building at 125 Summer Street, and will expand screen and weatherstrip manufacturing plant.

Eugene Reising, care of Henry W. Waterbury, Waterbury, Conn., attorney and representative, has organized Reising Alms Co., Inc., with capital of \$50,000, and plans establishment of factory for production of automatic guns and other weapons. Mr. Reising has previously operated similar plant in New York and will remove part of equipment to new Waterbury works.

Standard Oil Co. of New York, Inc., 26 Broadway, New York, and Park Square Building, Boston, has revised plans for a new bulk oil storage and distributing plant at Quincy, Mass., to cost over \$200,000 with equipment. Project will include an automobile service, repair and storage building.

E. T. Burrows Co., Inc., Portland, Me., is being organized to take over and operate E. T. Burrows Co., with local plant for manufacture of metal screens, etc., recently in financial difficulty. Additional capital of at least \$150,000 will be provided for production and operation.

Bureau of Yards and Docks, Washington, is in market for a 10-ton crane for Portsmouth, N. H., Navy Yard.

Philadelphia

PLANS have been filed by Philadelphia Gas Works Co., 1401 Arch Street, Philadelphia, for extensions and improvements in plant at Carbon and Toga Streets, to cost about \$25,000.

Bureau of Yards and Docks, Washington, has been authorized to prepare plans for following work at Philadelphia Navy Yard: Improvements in dry dock crane, \$25,000; extensions and improvements in power plant, \$50,000; in electric system \$35,000; and in buildings \$100,000; extension of shop building at Philadelphia Naval Air Station, \$225,000; work at Philadelphia naval aircraft factory, \$175,000. Bids on different projects will be asked soon.

W. A. Gibbs & Son, Inc., Chester, Pa., has been organized with capital of \$500,000, to take over local plant and business heretofore operated as W. A. Gibbs & Son, manufacturer of animal traps, traps, and appliances and devices, etc. New company proposes expansion. It is headed by Walter A. and William R. Gibbs, both of Holly Oak, Del.

Pennsylvania Railroad Co., 1000 Broadway, New York, N. Y., has authorized expansion and improvements over next 30 months to cost \$175,000,000, including electrification program in Phila-

delphia and Trenton districts and other betterment work. Plans will be arranged at once for electrification of all remaining parts of line between New York and Washington. Program includes purchase of 210 electric locomotives. Company engineering department is in charge.

Burnham Boiler Corp., Irvington-on-Hudson, N. Y., manufacturer of boilers and heating equipment, has leased two-story building, 160 x 195 ft., at Thirty-first and Jefferson Streets, Philadelphia, for a factory branch, storage and distributing plant.

Reilly-Whiteman-Walton Co., Conshohocken, Pa., manufacturer of refined oils, is asking bids until March 4 for a one and two-story addition, 120 x 144 ft., to cost over \$75,000 with equipment. L. Walton Heiss, Conshohocken, is company architect.

M. J. McHale, 136 West Market Street, Scranton, Pa., has organized L. J. McHale, Inc., with capital of \$10,000, to operate local plant for manufacture of machine specialties for textile mills.

Atlantic Pipe Line Co., an interest of Atlantic Refining Co., 260 South Broad Street, Philadelphia, has purchased pipe lines and properties of Gulf Coast Pipe Line Co., in Refugio, Tex., oilfield district, extending from that point to Harbor Island, near Port Aransas, including bulk storage and distributing plants, terminal facilities, etc. Purchasing company will carry out expansion, operating with other oil properties in Texas fields.

Detroit

BOARD of Education, Eleton, Mich., is considering installation of manual training equipment in two-story and basement high and grade school, to cost about \$160,000 with equipment. Lane, Davenport & Bennett, Charlevoix Building, Detroit, are architects.

Michigan Outboard Motors Co., 1229 East Atwater Street, Detroit, has been organized to operate a local boat-building and repair works. George K. Cheatham and John D. Gibbons are principal incorporators.

Rich Mfg. Co., 3855 Santa Fe Avenue, Los Angeles, manufacturer of semi-steel and non-ferrous motor valves and tappets, and kindred castings, is arranging for erection of a new plant at Battle Creek, Mich., to cost over \$250,000 with equipment. Present works will be removed to new location and capacity increased. Battle Creek Chamber of Commerce has arranged bond subscription of \$100,000 to insure industry for city. New plant is expected to be ready for occupancy in fall. George R. Rich is head.

Hutto Engineering Co., 515 Lyncaste Street, Detroit, manufacturer of grinding machinery and parts, has been reorganized and receivership has been terminated. New organization plans increased output, and is headed by Marsden C. Hutto, chairman of board; Henry P. Kirschner, president; and Roy H. Curtiss, secretary and treasurer. Joseph A. Carlin, who has been acting as receiver, will be general manager.

Michigan Leather Packing Co., 518 East Fort Street, Detroit, manufacturer of mechanical packings, flanges, etc., contemplates a new plant on Freeland Avenue, on site, 75 x 310 ft., to cost close to \$50,000 with equipment. Present works will be removed to new location.

Rayvox Engineering Corp., Detroit, has changed its name to Power Filter Corp., of America, Inc., manufacturer of filters and other equipment.

Pittsburgh

ABOUT two acres near Brackenridge, Pa., has been purchased by Standard Oil Co. of Pennsylvania, People's Gas Building, Pittsburgh, for new storage and distributing plant, to cost over \$75,000 with equipment.

United States Engineer Office, Pittsburgh, is asking bids until March 2 for a quantity of tool steel.

Board of Education, Brentwood, Pa., plans installation of manual training equipment in new three-story and basement high school to cost about \$200,000, for which bids have been asked on general contract. H. W. Viehman and E. B. Lee, Chamber of Commerce Building, Pittsburgh, are architects.

Gulf Refining Co., Erie Annex, Pittsburgh, contemplates erection of new bulk oil storage and distributing plant at Warwood, W. Va., to cost over \$60,000 with equipment.

Board of Public Education, Administration Building, Pittsburgh, contemplates installation of manual training facilities in new high school unit on West Liberty Street, to cost over \$300,000, for which plans are being drawn by R. M. Trindle, Commonwealth Annex, architect.

Ohio Edison Co., Youngstown, Ohio, has arranged fund of \$1,200,000 for extending and improvements in properties near New Castle and Shermans and Mahoning Valley districts, Pa., including transmission lines. Company engineering department will be in charge.

St. Louis

FOLLOWING acquisition of plant and business of Crawford-Cox Machine Works, Joplin, Mo., by the Tri-State Supply Co., 504 Wall Street, Joplin, mechanical equipment, will make improvements in plant and occupy at early date.

Ru-Bon Wood Finishing Products Co., 500 West Seventh Street, Kansas City, Mo., has filed plans for a three-story and basement addition, to cost about \$30,000 with equipment.

Evans Lime Co., Seventy-ninth Street, Kansas City, Mo., has plans for two one-story plant additions, 30 x 50 ft. and 20 x 50 ft.

Board of Park Commissioners, Tulsa, Okla., has plans for a hangar at municipal airport, with repair and remodeling facilities, to cost about \$30,000 with equipment. Blair Brothers, Exchange Bank Building, are architects. A new administration building will also be erected to cost about \$40,000. Charles W. Short, Jr., 1607 East Tenth Street, is field manager in charge.

City Council, Hollister, Mo., plans installation of turbine pumping machinery in connection with extensions in municipal waterworks. Black & Veatch, Mutual Building, Kansas City, Mo., are engineers.

Atchison, Topeka & Santa Fe Railway Co., 80 East Jackson Boulevard, Chicago, has awarded general contract to Lundgren & Carlson, Topeka, Kan., for extensions and improvements in boiler plant at local locomotive repair shops, including machinery and basement addition, 34 x 70 ft. E. A. Harrison is company architect; address noted.

Arkansas-Missouri Power Co., Rhythville, Ark., is contemplating bond issue of \$500,000, part of fund to be used for ex-

tensions and improvements in power plants and system. Company is considering construction of new power dams on Spring River for hydroelectric power service, to cost \$325,000.

Springfield Gas & Electric Co., Springfield, Mo., is planning expansion and improvements in electric power and gas properties, to cost more than \$500,000. Company engineering department will be in charge.

Stump Brothers Brake & Iron Co., St. Louis, is inquiring for the following used equipment: angle bending roll 4 x 4 in. capacity, wide about 36 in. or 48 x 3/4 in. capacity, bending brake for 3/4 in. plate 60 or 72 in. long, electric hoist, 220 volt, a c, 60 cycles, 3 phase, 1 and 2-ton capacity, small combination machine for coping, punching, shearing, etc.

Chicago

CONTRACT has been awarded by Milwaukee Road, Union Station, Chicago, to Pike & Cook, 116 South Fifth Street, Minneapolis, for a one-story and basement produce terminal at Minneapolis, with conveying, loading and other equipment, to cost about \$100,000. Company engineering department, C. F. Loweth, chief engineer, is in charge.

Central Illinois Electric & Gas Co., Rockford, Ill., is disposing of bond issue of \$15,000,000, part of proceeds to be used for extensions and improvements. Company is a subsidiary of Central Gas & Electric Co., 105 West Adams Street, Chicago.

Board of Education, Quincy, Ill., plans installation of manual training equipment in new three-story school on Fourteenth Street, to cost over \$1,000,000, for which it is expected to ask bids on general contract in March. J. D. Chubb, 109 North Dearborn Street, Chicago, is architect; Dehrensmeier & Haffner, Western Catholic Union Building, Quincy, are associate architects.

Board of Trustees, State Epileptic Colony, Cambridge, Minn., has secured an appropriation of \$151,000 for new power plant. C. H. Johnston, 360 Robert Street, St. Paul, Minn., is architect; Pillsbury Engineering Co., 234 Nicollet Avenue, Minneapolis, Minn., is consulting engineer.

Great Northern Railway Co., St. Paul, Minn., has begun erection of new engine house with repair facilities at Glasgow, Mont., 54 x 250 ft., to cost over \$45,000 with equipment. Company engineering department is in charge.

Reliance Battery Products Co., Council Bluffs, Iowa, manufacturer of electric battery equipment, contemplates new plant at Plano, Ill., to cost over \$30,000 with equipment.

City Council, Grand Junction, Colo., has plans for a municipal electric light and power plant, to cost over \$600,000 with equipment. Wood & Weber, 810 Fourteenth Street, Denver, are consulting engineers.

Minnesota Valley Canning Co., Le Sueur, Minn., plans erection of two-story addition, 40 x 110 ft., with extension, 40 x 25 ft., to cost about \$70,000 with machinery. H. C. Gerlach & Co., 100 O. P. Building, Mankato, Minn., is architect, and Ralph W. Richardson, 116 East Fourth Street, St. Paul, engineer.

Silent Champion Engineering Co., Council Bluffs, Iowa, manufacturer of oil burners, has been incorporated with \$20,000 capital and will locate at 3749

West Broadway, in a two-story factory, 22 x 74 ft., to be erected for company, P. P. Brink, formerly of Glenwood, Iowa, is president and G. D. Löffler, Glenwood, is secretary. Factory is scheduled for completion in 30 days.

General Implement Co., manufacturer of plow machines, has decided to concentrate its manufacturing and engineering work at 626 North Highland Avenue, Aurora, Ill. Company's development work has been carried on during the past year at Evansville, Ind., and its manufacturing has been done at Racine, Wis., since the reorganization of the company in 1928. Manufacturing equipment now at Racine will be moved to Aurora as soon as possible. A. V. Jurek has retired from active management of the company and is succeeded by W. Leland Zide.

Cleveland

PLANS have been filed for Union Metal Mfg. Co., 1432 Walnut Avenue, S. E., Canton, Ohio, manufacturer of metal parts for street lightings, steel poles and kindred products, for a one-story addition, 60 x 200 ft., to cost over \$50,000 with equipment.

Mussonmeyer-Habell-Bailey Co., 1311 E. Ohio, care of H. H. Johnson, Union Trust Building, Cleveland, recently organized, plans operation of local factory for manufacture of automobile brake equipment. D. C. Sheppard, Jr., and Robert W. Wheeler are principal incorporators.

City Council, Hudson, Ohio, is considering erection of municipal electric light and power plant, to cost over \$20,000 with equipment.

Springfield Township Rural School District, Emerson, Ohio, R.F.D. No. 3, Akron, Ohio, clerk, is considering installation of manual training equipment in new high and grade school near Akron, to cost about \$200,000, for which bids have been asked on general contract. Henry A. Murphy, Second National Bank Building, Akron, are architects.

Hudson-Bartschert, Inc., Toledo, Ohio, recently organized, has purchased tool and die making department of Toledo School Co., 5216 Monroe Street. New company will maintain plant in present location and will add a line of special machinery and parts to production. Sharon J. Hudson is president of new organization. A. Bartschert, general manager, and F. H. Shanks, secretary and treasurer.

City Council, Shelby, Ohio, has plans for extensions and improvements in municipal electric light and power plant, including installation of additional equipment, at total cost of over \$200,000. Burns & McDonnell Engineering Co., Incorporated Building, Kansas City, Mo., is engineer.

City Council, East Cleveland, Ohio, is considering erection of a steel water tank on elevated steel tower, to cost close to \$25,000, for municipal water department. M. W. Garrett is city engineer.

Indiana

CONTRACT has been let by Eagle Machine Tool Co., 21 North Noble Street, Indianapolis, to W. E. Van Landingham, Leincke Building, for a one-story addition, including alterations and improvements in present building, to cost about \$25,000 with equipment.

Apex Electrical Mfg. Co., 1967 East

52nd Street, Cleveland, manufacturer of electric refrigerating machinery, vacuum cleaners and kindred electrical appliances, has purchased plant and business of Wayne Home Equipment Co., Fort Wayne, manufacturer of heat proof electric refrigerating equipment, parts, etc. Purchasing company will continue operations in present four-story factory of Wayne company and plans increased production. C. G. Pankix is president of Apex company.

Ovens, power equipment, conveying and other machinery will be installed in new baking plant addition of G. W. Opell & Co., 1910 North Second Street, Vincennes, to cost close to \$50,000. Sutton & Bondt Vincennes are architects.

Art Fleck, 719 Union Title Building, Indianapolis, architect, has awarded general contract to Thomas A. Moynihan Construction Co., Union Title Building, for three-story and basement automobile service, repair and garage building, 120 x 150 ft., to cost about \$175,000 with equipment.

J. L. Case Co., State Street, Racine, Wis., manufacturer of agricultural implements and equipment, will build a second story on unit recently leased at Indianapolis for factory branch, service and distributing plant. Present branch at 210 Kentucky Avenue, will be removed to new location in April and facilities expanded. A. G. Kellum is local branch manager.

Cincinnati

BIDS will soon be asked by Board of Trustees, University of Cincinnati, Administration Building, for a new central mechanical shop, equipment storage and distributing building, 65 x 112 ft., to cost close to \$100,000 with equipment. Hunt & Allen, Eagle Savings & Loan Building, are architects. Daniel Laurence is clerk of board.

Contracting Office, Wright Field, Dayton, Ohio, will receive bids until March 2 for one motor-driven spur gear planer, and 20 propeller hub assemblies, until March 2 for 750 control unit assemblies, and until March 4 for 5000 airspeed indicator taking connections, 2000 technician shaft washers, adapter assemblies, etc.

M. & H. Tool Co., Inc., Springfield, Ohio, recently organized, care of Cole, Bowman & Hodge, First National Bank Building, attorneys, plans operation of local factory for manufacture of tools and kindred products. H. A. Pratt and A. C. McDonald are principal incorporators.

Kentucky-Tennessee Light & Power Co., Bowling Green, Ky., is planning erection of hydroelectric power plant on Barron River, to cost over \$1,000,000 with transmission system.

W. T. Wagner's Sons Co., 1924 Race Street, Cincinnati, producer of artificial mineral waters, has awarded general contract to Penker Construction Co., 1039 Sumner Street, for three-story and basement bottling plant, 105 x 120 ft., to cost over \$100,000 with automatic bottling, conveying and other mechanical equipment. Gustav Brach, Inc., Union Trust Building, is architect. Carl J. Kiefer, Schmidt Building, is engineer.

Common Council, Adairsville, Ky., is considering installation of a 75,000-gal. elevated steel tank and tower, in connection with extensions in municipal water system. C. N. Hartsh Engineering Co., Fourth and First National Bank Building, Nashville, Tenn., is engineer.

Chamber of Commerce, Trenton, Tenn., Charles E. Meyers, secretary, is at head of project for establishment of an airport on 70-acre tract, including hangar with repair and reconditioning facilities, and other field units.

Fisher Body Co., North Second Street, Memphis, Tenn., with headquarters in General Motors Building, Detroit, contemplates extensions and improvements in local branch plant, to cost over \$75,000.

Milwaukee

GENERAL contract has been placed with Pfeiffer Construction Co., 286 Sixty-sixth Avenue, West Allis, for an addition, 35 x 75 ft., one-story, for Pioneer Mfg. Co., 726 Seventy-fourth Avenue, West Allis, manufacturer of power cultivation machinery and moulding machines.

Milwaukee Metropolitan Sewerage Commission, Jones Island, Milwaukee, closes bid March 9 on two 2500-gal. per min. motor operated, float controlled centrifugal pumps and accessories and all other equipment required for new sewerage booster station at Port Washington and River Roads. John H. Fowles is secretary.

Plans are being prepared by Col. H. C. Hensel, State military architect, 759 North Milwaukee Street, Milwaukee, for two one-story storage-service buildings at Camp Douglas, Wis., 50 x 200 ft. and 41 x 142 ft., respectively, for motorized equipment and field equipment.

Board of Vocational Education, Manitowish, Wis., has ordered plans revised by William J. Raueber, local architect, 926 South Eight Street, for new vocational school, to bring cost within appropriation of \$200,000.

Milwaukee Electric Railway & Light Co., 217 Michigan Street, Milwaukee, contemplates erection and equipment of brick and general clay products plant, costing about \$100,000, at Port Washington, Wis., in connection with development of clay hills in development of \$10,000,000 steam generating plant, now under way. Fred A. Luber is company architect and engineer.

Waukesha Motor Co., Waukesha, Wis., has received an order for 7500 four-cylinder truck motors of 15 to 30 hp. each. H. L. Horning, president, states that business has been gradually improving since last August.

Gulf States

PLANS are under way by Buford Refining Co., Pecos, Tex., for new oil refinery at Longview, Tex., to cost over \$175,000 with machinery.

Construction Quartermaster, United States Army, Maxwell Field, Montgomery, Ala., has awarded general contract to Smith, Few Construction Co., Atlanta, Ga., for new units at field, including one-story maintenance shop, 70 x 123 ft.; automobile service and garage building, 104 x 206 ft.; equipment storage and distributing warehouse, 163 x 207 ft.; and paint and oil house, 17 x 40 ft., to cost \$81,890, exclusive of equipment.

Ovens, power equipment, conveying and other machinery will be installed in one-story plant, 70 x 140 ft., to be erected by El Fenix Bakery, 291 South Laredo Street, San Antonio, Tex., to cost close to \$100,000. L. M. J. Diemann, 306 East Commerce Street, is architect.

Lone Star Portland Cement Co., Houston, Tex., contemplates an addition to plant to cost close to \$75,000 with equipment.

Burris Panhandle Elevators, Inc., Amarillo, Tex., has work under way on new grain elevator, with elevating, screening, conveying and other equipment for capacity of 1,000,000 bu., to cost \$125,000. J. Perry Burris, Dallas, Tex., is president.

Board of Trustees, Prairie View State Normal and Industrial College, Prairie View, Tex., will proceed with erection of three-story addition, 46 x 119 ft., to cost close to \$100,000.

Board of Works, Fort Worth, Tex., has awarded general contract to Guide & Andrews, 2212 West Seventh Street, for new one-story unit a municipal airport, at \$29,887, for repair and reconditioning shops of Texas Aero Corps, Fort Worth.

Magnolia Petroleum Co., Dallas, Tex., an interest of Standard Oil Co. of New York, 26 Broadway, New York, is planning construction of new pipe line from Kilgore, Tex., to connection with present line extending to Noches, Tex., about 70 miles, to cost close to \$250,000.

Pacific Coast

GENERAL contract has been let by Ford Motor Co., Dearborn, Mich., to Clinton Construction Co., 925 Polson Street, San Francisco, for new assembling plant at Seattle, consisting of one-story assembling unit, 320 x 750 ft., with part two-stories, 160 x 750 ft., power house and other structures, to cost over \$3,000,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer. It is planned to have works ready for service in November. R. W. Hine is local manager at Seattle.

Contract has been let by Pacific Air Transport, San Diego, Cal., to Austin Co. of California, Inc., Los Angeles, for a hangar with repair and reconditioning facilities at local Lindbergh Field, to cost about \$50,000 with equipment.

In connection with Government construction program, Bureau of Yards and Docks, Navy Department, Washington, will prepare plans and specifications for work at Pacific Coast navy yards as follows: San Diego, floating derrick, \$100,000; improvements in crane tracks, \$60,000; Mare Island, floating derrick, \$100,000; Puget Sound, improvements in power plant \$75,000; improvements and extensions in dry dock No. 1, \$400,000; extension of fuel oil system, \$75,000; also improvements in gasoline storage at naval air station, San Diego, \$50,000.

California Lime & Products Co., Lincoln, Cal., R. L. Hollingsworth, general manager, has purchased 60 acres of limestone deposits at Antelope, Cal., and has plans for new stone quarry with crushing, loading, conveying and other machinery to cost about \$125,000. Plans will also be drawn for a lime manufacturing plant and for a dry ice manufacturing plant. Installation will include cableway, bunkering system, raw material storage and distributing units and other structures. Entire project will cost over \$700,000. Smith-Emery Co., 651 Howard Street, San Francisco, is engineer.

G. W. Price Pump & Engine Co., 1330 Polson Street, San Francisco, has awarded general contract to Charles W. Koenig, San Francisco, for a one-story plant, to cost about \$25,000 with equip-

ment. E. A. Neunmark, 316 Kearny Street, is architect.

Southern Sierras Power Co., Riverside, Cal., has plans for a power substation at Las Vegas, Nev., for service in connection with Hoover Dam project, to cost \$250,000 with equipment. Work is under way on a new transmission line. Company engineering department is in charge.

Board of Education, Medford, Ore., is considering installation of man-training equipment in new two-story high school to cost close to \$200,000, for which bids will soon be asked on general contract. Frank C. Clark, Medford, is architect; Knighdon & Howell, United States Bank Building, Portland, are associate architects.

Tucson Gas, Electric Light & Power Co., Tucson, Ariz., has plans for extensions and improvements in steam-operated electric power plant, including installation of Diesel engine and auxiliary equipment, to cost over \$200,000. Company engineering department is in charge.

Pompey Saml & Grayson Co., 904 Harrison Street, Seattle, has awarded general contract to General Construction Co., Chicago Building, for new distributing plant, including conveyor power platform, crane platform and mechanical handling facilities, to cost about \$400,000.

Canada

WORK will be started at once by Trench Mfg. Co. (Canada), Ltd., 393 East 113rd Street, Cleveland, Ohio representative, W. H. Reid, 81 Victoria Street, Toronto, on first unit of a plant at Leaside, Ont., for manufacture of waterproofing, caulking and flanging compounds. Bids are being received by Marani & Lawson, architects, 35 Blue Street West, Toronto. Project will represent an expenditure of between \$150,000 and \$400,000.

Lodge Motor Co., Detroit, has secured factory building at Walkerville, Ont., and is installing equipment for manufacture of motors. Company will carry on machining operations on a number of parts; other parts will be imported from Detroit or procured in Canada.

Cherry Russell Corp., of Canada, Ltd., 502 Canadian Rail & Harbor Terminals Building, Toronto, manufacturer of dairy machinery, etc., will remove main plant and headquarters from Toronto to Brockville, Ont., where company has operated a branch plant for several years.

General Smelting Co. of Canada, Ltd., recently incorporated with a Federal charter, will establish a plant at Hamilton, Ont., on site leased from Steel Co. of Canada, Ltd., and a building is now in course of erection. J. N. Pomeroy, vice-president of American company, with headquarters at Philadelphia, is president of Canadian company. Company will refine zinc from dross and later will treat other metals.

Anthese Foundry, Ltd., 64 Jefferson Street, Toronto, has secured site at East Calgary, Alta., and is contemplating erecting a foundry.

E. T. Duly, whose foundry on Northern Avenue, Vancouver, B. C., was recently destroyed by fire, has secured a site on Lulu Island, and will rebuild at once. Company's tinmith shop will continue in its present premises at 359 East Broadway, Vancouver.

Foreign

PLANS have been approved by Public Works Department, Government of Hungary, Budapest, for electrification of Hungarian section of Budapest-Vienna Railway and work will be started soon. Ministry Department, Government of Austria, is planning for similar electrification of section of railroad in that country to Vienna.

General Motors of Australia, Ltd., Sydney, has acquired plant and business of Holden's Automobile Body Co., capitalized at \$5,500,000, with main works at Sydney, and will continue operation as a subsidiary. Car bodies will be made for different cars of General Motors organization.

A railroad company in England has authorized expansion and improvements to cost about \$5,000,000, including line extensions, shops, buildings, etc. Information at office of Bureau of Foreign and Domestic Commerce, Washington, references United Kingdom No. 1160.

Bureau of Yards and Docks, Navy Department, Washington, is planning erection of new aircraft works at Pearl Harbor, T. H., including engine shop, repair and reconditioning shop and other departments, to cost over \$200,000. Bids will be asked soon.

Board of Electricity Commissioners, Edinburgh, Scotland, is arranging for electric power development in southern part of country. Project will include construction of five new hydroelectric power plants at Tongland, Glenlee, Kenderoh, Carsfad and Karlstoun, to be operated by Galloway Water Power Co., and building of transmission lines for distance of 150 miles, with seven primary switching and power substations. Entire development will cost \$13,468,800.

New Trade Publications

Chain-Block.—Herbert Morris Crane & Hoist Co., Ltd., Niagara Falls, Canada. Eight-page illustrated booklet featuring the "Master-Gear" Block. Lubrication is concentrated by applying the requisite lubricant for all main bearings at one point.

Arc Welders.—General Electric Co., Schenectady, N. Y. Bulletin GEA-1031B illustrates and describes several models of resistor arc welders suitable for use with 60-volt, constant-potential arc welding generators, 200-275-volt supply circuits (mining service) and 400-650-volt circuits (electric-railway work).

Oil Circuit Breakers.—General Electric Co., Schenectady, N. Y. Seven-page bulletin GEA-959B, illustrated, dealing with type FKB-155 indoor oil circuit breakers for moderate and heavy-duty service at any altitude.

Flow Meter.—Brown Instrument Co., Philadelphia. A novel illustration in the form of a card with moving parts, featuring the inductance-bridge principle applied to flow meter design.

Brass Rods.—Titan Metal Mfg. Co., Bellefonte, Pa. Circular describing the Nitanny free-turning brass rods, designed to meet the most rigid specifications for brass screw machine rods.

Unit Heaters.—Buffalo Forge Co., Buffalo. Bulletin of 19 pages, illustrating and describing several types of unit heaters, suitable for any steam pressure from 2 lb. to 250 lb.; also gas unit heaters for industrial use.

Create Unemployment Fund

Rochester Plants Adopt Plan Which Will Pay Benefits to Idle for Six to 13 Weeks

AN unemployment benefit plan providing a permanent fund, built up from appropriations of 2 per cent of the annual payroll of participating companies and supplemented with 1 per cent salary contributions by employees in periods of emergency, has been adopted by 14 manufacturers in Rochester, N. Y. All but two are members of the Industrial Management Council of Rochester, under the auspices of which the plan was developed.

Adherents of the "Rochester Unemployment Benefit Plan," as it is called, are Eastman Kodak Co., Davenport Machine Tool Co., Consolidated Machine Tool Co., Gleason Works, Yawman & Erbe Mfg. Co., Taylor Instrument Co., Vogt Mfg. Co., Cochrane Bly Co., Bausch & Lomb Optical Co., Stromberg-Carlson Telephone Mfg. Co., Rochester Telephone Corp., Todd Co., Sargent & Greenleaf Co. and the Pfaunder Co. Other Rochester manufacturing companies are considering participation.

Fund Available in 1933

The original signers of the agreement employ a total of about 26,000 in normal periods of business, with individual plant enrollments ranging from 45 to 13,000 employees. Under the plan, each company will immediately begin setting aside up to 2 per cent of its payroll annually, the amount being dependent upon the degree of stabilization obtaining in its field. The fund will have reached a sufficient total by 1933 to permit the beginning of unemployment payments. The maximum of the fund will be reached when it is equal to five annual appropriations of the participating companies.

Under normal business conditions the entire expense of the plan is borne by the companies themselves, no contributions being asked from employees, but the signers reserve the right to declare an emergency to exist should there be an extended period of unemployment, and to add to the fund 1 per cent of the salaries of all officials and employees not receiving benefits under the plan. However, when such a step is taken the companies will contribute an additional amount, equivalent to the total received from the salaried employees.

Benefits up to 13 Weeks

In distributing the benefit fund, employees who have served one year or more and have been receiving less than \$50 a week will be eligible to receive payments. The benefits will be 60 per cent of the normal pay, the maximum payment being \$22.50 a

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Where workers are employed only part time by a company, benefits will be paid, provided their total earnings are less than they would receive in benefits if entirely unemployed. Should an employee secure temporary work outside the industry, he will still be eligible for a benefit, provided his temporary earnings and the benefit paid do not exceed his normal earnings when employed full time, prior to being laid off.

A Plan for the Future

Commenting on the new plan, James E. Gleason, president, the Gleason Works, and chairman of the Industrial Management Council, which aided in developing the plan, said: "It is very gratifying that we have found

it possible to set up these unemployment benefit funds as something additional to our present efforts, something that will work long after this depression we have been in has passed.

"While payments are to begin no earlier than 1933, ample reserves are absolutely necessary; the firms will begin to set aside those funds now. While the companies have reserved the right to change the plan in detail in adapting it to individual conditions, I am proud to say that every intention to vary that I have heard of is for some special liberality."

Eastman Kodak Benefits to Continue

Adoption of this plan, says Frank W. Lovejoy, vice-president and general manager of the Eastman Kodak Co., will not affect in any way the other plans of the company, such as the wage dividend, retirement annuity, life insurance, disability benefit and sick benefit plans, which are already in operation.

"This Rochester unemployment benefit plan," says W. Roy McCanne, president, Stromberg-Carlson Telephone Mfg. Co., "is an additional effort further to minimize the effect on the employee of future depressions. Besides its humaneness, probably the plan's greatest benefit will come from stimulating efforts to prevent future unemployment."

Ajax Metal Co. Organizes Two Subsidiaries

The Ajax Metal Co., Philadelphia, has decided to proceed with the carrying out of plant improvements and extensions that have been in contemplation for some time. Directors have appropriated \$300,000 with the idea of contributing something to the relief of unemployment. The company says:

"If similar steps were to be taken to the greatest extent possible by many others, the unemployment problem would not long be with us, and confidence would be restored."

Extensions will take the form of a two-story annex to the present buildings, making it possible to accommodate eight freight cars at one time for the loading and unloading of shipments. The latest material-handling devices will be installed.

The Ajax Metal Co. has organized a new subsidiary, the Ajax Electric Co., Inc., which will develop and exploit electric resistance heating equipment. The Electric Resistance Furnace Co., Ltd., of Great Britain, subsidiary of the Electric Furnace Co., Ltd., has developed an extensive line of such equipment which will be introduced in this country by the Ajax Electric Co. The Electric Furnace Co., Ltd., has long been associated with the Ajax Metal Co. and the Ajax Electrothermic Corp. The plant of the Ajax

Electric Co. will be at Frankford Avenue and Allen Street, Philadelphia, just opposite the main plant of the Ajax Metal Co. Officers of the new company are: G. H. Clamer, president; William Adam, Jr., vice-president; John E. Haig, secretary, and E. Allan Ginkinger, treasurer.

The Ajax Electrothermic Corp., the division of the Ajax Metal Co. which manufactures the Ajax-Northrup high-frequency coreless induction method of heating, has from the beginning operated as a separate company, but largely controlled by the Ajax Metal Co. The Ajax-Wyatt Division, which has manufactured the Ajax-Wyatt submerged resistor induction type furnace, has been operated as a department of the metal company.

It is now intended to divorce the Ajax-Wyatt Electric Furnace Division and, accordingly, a separate company, under the name of Ajax Electric Furnace Corp., has been organized to carry on the activities in the line of submerged resistor induction electric furnaces. The following officers were elected: G. H. Clamer, president and general manager; James R. Wyatt, vice-president in charge of manufacturing and development; Henry Gieseke, secretary; E. Allan Ginkinger, treasurer. The company will occupy its newly completed building on Frankford Avenue near the main plant of the Ajax Metal Co.

British Pig Iron Industry

Urges Prohibition of all Imports

(By Cable)

LONDON, ENGLAND, Feb. 23.

THE pig iron industry is in a serious condition, with only 76 furnaces in blast at the end of December compared with 162 operating at the close of 1929.

As a result, a further appeal has been made to the Government for intervention, taking the form of a letter and memorandum addressed to the Board of Trade by Sir Francis Joseph, chairman, Central and Basic Iron Producers' Associations.

The letter states that unless the Government takes action at once, collapse of the industry is inevitable. In spite of an alarming decrease in pig iron production, stocks at furnaces are greatly increased, and have become a crippling burden.

Increase in stocks has occurred despite substantial reductions in prices. Although vast sums have been spent in reorganization, the most efficient furnaces are unable to dispose of their output.

The letter concludes with an appeal for severe limitation or absolute prohibition of imports of iron and steel.

Domestic railroads have placed orders with Northeastern producers for 16,000 tons of rail chairs. Consequently the tone of pig iron has improved temporarily and Cleveland furnaces are expecting increased sales.

Continental iron is still arriving,

Chinese Government decides to use "Skoda" locomotives as standard railroad equipment.

* * *

Soviet Union buys 28 locomotives in Germany.

* * *

Krupp develops new 15-ton motor truck, which tows two loaded 10-ton trailers.

* * *

American aircraft output declined 45 per cent in 1930, but exports decreased only 4.3 per cent and reached 29 new markets.

livery delays on new orders are beginning to be extended. Buying here is still at a low ebb, and prices generally are maintained.

Tin plate inquiry is broadening, but business is quiet. Developments in the tin market are watched by buyers and further rises in price may influence consumers. Meanwhile tin plate makers are preparing to close as orders are completed, so that output is likely to be seriously diminished in the near future.

The Gyron Tin Plate Works at Ystalyfera has issued a 28-day notice that employment will subsequently be on a day to day contract basis.

Galvanized sheet makers have reaffirmed their prices and the market is still quiet. Black sheet demand is limited to small lots of the heavier gages.

The Chinese Northern Railway and the Chinese Government have agreed to adopt locomotives made by the Skoda Works as standard for future contracts.

The Rumanian Government is endeavoring to combine all iron and steel plants into one corporation.

German production in January was 603,000 tons of pig iron with 61 furnaces in blast at the end of January. Raw steel output was 773,000 tons and rolled steel production, 540,000 tons. The German Ruhrort-Meiderich works has closed this week having been unable to reach an agreement

but imports are likely to diminish in the near future, as new business is almost entirely lacking.

Hematite iron is moving rather more freely and makers' stocks are decreasing.

Finished steel is dull with mills in need of shipbuilding orders, and output at a low level.

Export demand is broadening in small lots indicating low stocks abroad, which is compelling replacement. Bulk orders, however, are entirely absent.

The Continent reports better demand from India and China, as a result of lower ocean freights, and de-

British and Continental European Export Prices per gross ton, f. o. b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.8665 (par)

British Prices, f. o. b. United Kingdom Ports

Pig iron, export, 19 0s. to 11 5s.	\$42.74 to \$54.75
Billets, open-hearth, 5 7½ to 5 10	26.12 to 26.76
Black sheets, Japanese specifications, 11 10	55.95
Tin plate, per base box, 0 15½ to 0 15¾	3.77 to 3.80
Steel bars, open-hearth, 7 15 to 8 5	1.59 to 1.79
Beams, open-hearth, 7 7½ to 7 17½	1.60 to 1.71
Channels, open-hearth, 7 12½ to 8 12½	1.66 to 1.87
Angles, open-hearth, 7 7½ to 7 17½	1.60 to 1.71
Black sheets, No. 24 gage, 8 10	1.84
Galvanized sheets, No. 24 gage, 11 0	2.42

Continental Prices, f. o. b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.60 per cent and more phosphorus, £2 10s. to £2 12s.	\$12.15 to \$12.64
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Billets, Thomas (nominal), £2 10s. to £2 11s.	\$17.61 to \$17.25
Wire rods, low C., No. 3 B.W.G., 5 2½ to 5 7½	24.94 to 26.13
Rolls, light, 6 0	29.20
Black sheets, No. 31 gage, Japanese, 11 2 to 12 12	54.68 to 58.32
Steel bars, merchant, 4 0 to 4 2	0.87 to 0.88
Beams, Thomas, British standard (nominal), 3 11 to 3 12	0.79 to 0.80
Channels, Thomas, American sections, 5 12 to 5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over ¾-in. thick, 3 10 to 4 0	0.85 to 0.86
Angles, Thomas, 3-in., 4 1 to 4 3	0.87 to 0.89
Hoop and strip steel over 6-in. base, 4 10 to 4 11	0.96 to 0.97
Wire, plain, No. 8 gage, 5 12½ to 5 15	1.24 to 1.27
Wire, barbed, 4-pt., No. 12 B.W.G., 3 7½ to 3 10	2.08 to 2.09
Wire nails, bases, 5 17½ to 6 0	\$1.29 to \$1.39 a keg

West Broadway, in a two-story factory, 22 x 74 ft., to be erected for company, P. P. Brink, formerly of Glenwood, Iowa, is president and G. D. Löffler, Glenwood, is secretary. Factory is scheduled for completion in 30 days.

General Implement Co., manufacturer of plow combines, has decided to concentrate its manufacturing and engineering work at 626 North Highland Avenue, Aurora, Ill. Company's development work has been carried on during the past year at Evansville, Ind., and its manufacturing has been done at Racine, Wis., since the organization of the company in 1928. Manufacturing equipment now at Racine will be moved to Aurora as soon as possible. A. V. Burch has retired from active management of the company and is succeeded by W. Leland Zink.

Cleveland

PLANS have been filed by Union Metal Mfg. Co., 1432 Walnut Avenue, S. E., Canton, Ohio, manufacturer of metal posts for street-lightings, steel poles and kindred products, for a one-story addition, 60 x 340 ft., to cost over \$60,000 with equipment.

Musselman Hub-Brake Co., Elyria, Ohio, care of H. H. Johnson, Union Trust Building, Cleveland, recently organized, plans operation of local factory for manufacture of automobile brake equipment. D. C. Shepard, Jr., and Robert W. Wheeler are principal incorporators.

City Council, Lisbon, Ohio, is considering erection of municipal electric light and power plant, to cost over \$70,000 with equipment.

Springfield Township Rural School District, Emerson Boyer, R.F.D. No. 2, Akron, Ohio, clerk, is considering installation of manual training equipment in new high and grade school near Akron, to cost about \$200,000, for which bids have been asked on general contract. Henry & Murphy, Second National Bank Building, Akron, are architects.

Hudson-Burtscher, Inc., Toledo, Ohio, recently organized, has purchased tool and die making department of Toledo Schale Co., 3216 Monroe Street. New company will maintain plant at present location and will add a line of special machinery and parts to production. Sharon J. Hudson is president of new organization; A. Burtscher, general manager; and P. H. Shanks, secretary and treasurer.

City Council, Shelby, Ohio, has plans for extensions and improvements in municipal electric light and power plant, including installation of additional equipment, at total cost of over \$200,000. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is engineer.

City Council, East Cleveland, Ohio, is considering erection of a steel water tank on elevated steel tower, to cost close to \$25,000, for municipal water department. M. W. Garnett is city engineer.

Indiana

CONTRACT has been let by Eagle Machine Tool Co., 24 North Noble Street, Indianapolis, to W. E. Van Landingham, Lemcke Building, for a one-story addition, including alterations and improvements in present building, to cost about \$25,000 with equipment.

Apex Electrical Mfg. Co., 1067 East

152nd Street, Cleveland, manufacturer of electric refrigerating machinery, vacuum cleaners and kindred electrical appliances, has purchased plant and business of Wayne Home Equipment Co., Fort Wayne, manufacturer of heat proof electric refrigerating equipment, parts, etc. Purchasing company will continue operations in present four-story factory of Wayne company and plans increased production. C. G. Frantz is president of Apex company.

Ovens, power equipment, conveying and other machinery will be installed in new baking plant addition of G. W. Opell Co., 1910 North Second Street, Vincennes, to cost close to \$50,000. Sutton & Rott, Vincennes, are architects.

Art Fleck, 710 Union Title Building, Indianapolis, architect, has awarded general contract to Thomas A. Moynahan Construction Co., Union Title Building, for three-story and basement automobile service, repair and garage building, 120 x 150 ft., to cost about \$175,000 with equipment.

J. I. Case Co., State Street, Racine, Wis., manufacturer of agricultural implements and equipment, will build a second story on unit recently leased at Indianapolis for factory branch, service and distributing plant. Present branch at 241 Kentucky Avenue, will be removed to new location in April and facilities expanded. A. G. Kellam is local branch manager.

Cincinnati

BIDS will soon be asked by Board of Trustees, University of Cincinnati, Administration Building, for a new central mechanical shop, equipment storage and distributing building, 65 x 112 ft., to cost close to \$100,000 with equipment. Hunt & Allan, Eagle Savings & Loan Building, are architects. Daniel Laurence is clerk of board.

Contracting Officer, Wright Field, Dayton, Ohio, will receive bids until March 2 for one motor-driven spur gear planer, and 30 propeller hub assemblies; until March 3 for 250 control unit assemblies, and until March 4 for 5000 airspeed indicator tubing connections, 2000 tachometer shaft washers, adapter assemblies, etc.

M. & H. Tool Co., Inc., Springfield, Ohio, recently organized, care of Cole, Bowman & Hodge, First National Bank Building, attorneys, plans operation of local factory for manufacture of tools and kindred products. H. A. Prout and A. C. McDaniel are principal incorporators.

Kentucky-Tennessee Light & Power Co., Bowling Green, Ky., is planning erection of hydroelectric power plant on Barron River, to cost over \$1,000,000 with transmission system.

W. T. Wagner's Sons Co., 1924 Race Street, Cincinnati, producer of artificial mineral waters, has awarded general contract to Penker Construction Co., 1030 Summer Street, for three-story and basement bottling plant, 105 x 120 ft., to cost over \$100,000 with automatic bottling, conveying and other mechanical equipment. Gustav Drach, Inc., Union Trust Building, is architect; Carl J. Kiefer, Schmidt Building, is engineer.

Common Council, Adairsville, Ky., is considering installation of a 75,000-gal. elevated steel tank and tower, in connection with extensions in municipal water system. C. N. Harrub Engineering Co., Fourth and First National Bank Building, Nashville, Tenn., is engineer.

Chamber of Commerce, Trenton, Tenn., Charles E. Meyers, secretary, is at head of project for establishment of an airport on 70-acre tract, including hangar with repair and reconditioning facilities, and other field units.

Fisher Body Co., North Second Street, Memphis, Tenn., with headquarters in General Motors Building, Detroit, contemplates extensions and improvements in local branch plant, to cost over \$75,000.

Milwaukee

GENERAL contract has been placed with Pfeiffer Construction Co., 586 Sixty-sixth Avenue, West Allis, for an addition, 35 x 75 ft., one-story, for Pioneer Mfg. Co., 726 Seventy-fourth Avenue, West Allis, manufacturer of power cultivation machinery and moulding machines.

Milwaukee Metropolitan Sewerage Commission, Jones Island, Milwaukee, closes bids March 9 on two 2500-gal. per min. motor operated, float controlled centrifugal pumps and accessories and all other equipment required for new sewage booster station at Port Washington and River Roads. John H. Fowles is secretary.

Plans are being prepared by Col. H. C. Hengel, State military architect, 759 North Milwaukee Street, Milwaukee, for two one-story storage-service buildings at Camp Douglas, Wis., 50 x 200 ft. and 44 x 142 ft., respectively, for motorized equipment and field equipment.

Board of Vocational Education, Manitowoc, Wis., has ordered plans revised by William J. Raeuber, local architect, 926 South Eight Street, for new vocational school, to bring cost within appropriation of \$200,000.

Milwaukee Electric Railway & Light Co., 217 Michigan Street, Milwaukee, contemplates erection and equipment of brick and general clay products plant, costing about \$100,000, at Port Washington, Wis., in connection with demolition of clay hills in development of \$10,000,000 steam generating plant, now under way. Fred A. Luber is company architect-engineer.

Waukesha Motor Co., Waukesha, Wis., has received an order for 7500 four-cylinder truck motors of 15 to 30 hp. each. H. L. Horning, president, states that business has been gradually improving since last August.

Gulf States

PLANS are under way by Burford Refining Co., Pecos, Tex., for new oil refinery at Longview, Tex., to cost over \$175,000 with machinery.

Construction Quartermaster, United States Army, Maxwell Field, Montgomery, Ala., has awarded general contract to Smith, Pew Construction Co., Atlanta, Ga., for new units at field, including one-story maintenance shop, 70 x 123 ft.; automobile service and garage building, 103 x 206 ft.; equipment storage and distributing warehouse, 103 x 207 ft.; and paint and oil house, 17 x 40 ft., to cost \$81,890, exclusive of equipment.

Ovens, power equipment, conveying and other machinery will be installed in one-story plant, 70 x 140 ft., to be erected by El Fenix Bakery, 201 South Laredo Street, San Antonio, Tex., to cost close to \$100,000. L. M. J. Dielmann, 306 East Commerce Street, is architect.

Lone Star Portland Cement Co., Houston, Tex., contemplates an addition to plant to cost close to \$75,000 with equipment.

Burrus Panhandle Elevators, Inc., Amarillo, Tex., has work under way on new grain elevator, with elevating, screening, conveying and other equipment for capacity of 1,000,000 bu., to cost \$125,000. J. Perry Burrus, Dallas, Tex., is president.

Board of Trustees, Prairie View State Normal and Industrial College, Prairie View, Tex., will proceed with erection of three-story addition, 46 x 119 ft., to cost close to \$100,000.

Board of Works, Fort Worth, Tex., has awarded general contract to Quisile & Andrews, 2212 West Seventh Street, for new one-story unit a municipal airport, at \$29,987; for repair and reconditioning shops of Texas Aero Corp., Fort Worth.

Magnolia Petroleum Co., Dallas, Tex., an interest of Standard Oil Co. of New York, 26 Broadway, New York, is planning construction of new pipe line from Kilgore, Tex., to connection with present line extending to Neches, Tex., about 70 miles, to cost close to \$250,000.

Pacific Coast

GENERAL contract has been let by Ford Motor Co., Dearborn, Mich., to Clinton Construction Co., 923 Folsom Street, San Francisco, for new assembling plant at Seattle, consisting of one-story assembling unit, 320 x 750 ft., with part two-stories, 160 x 750 ft., power house and other structures, to cost over \$3,000,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer. It is planned to have works ready for service in November. R. W. Hinea is local manager at Seattle.

Contract has been let by Pacific Air Transport, San Diego, Cal., to Austin Co. of California, Inc., Los Angeles, for a hangar with repair and reconditioning facilities at local Lindbergh Field, to cost about \$50,000 with equipment.

In connection with Government construction program, Bureau of Yards and Docks, Navy Department, Washington, will prepare plans and specifications for work at Pacific Coast navy yards as follows: San Diego, floating derrick, \$100,000, improvements in crane tracks, \$60,000; Mare Island, floating derrick \$100,000; Puget Sound, improvements in power plant \$75,000, improvements and extensions in dry dock No. 1, \$400,000, extension of fuel oil system, \$75,000; also improvements in gasoline storage at naval air station, San Diego, \$50,000.

California Lime & Products Co., Lincoln, Cal., R. L. Hollingsworth, general manager, has purchased 60 acres of limestone deposits at Antelope, Cal., and has plans for new stone quarry with crushing, loading, conveying and other machinery to cost about \$125,000. Plans will also be drawn for a lime manufacturing plant and for a dry ice manufacturing plant. Installation will include cableway, bunkering system, raw material storage and distributing units and other structures. Entire project will cost over \$700,000. Smith-Emery Co., 651 Howard Street, San Francisco, is engineer.

G. W. Price Pump & Engine Co., 1350 Folsom Street, San Francisco, has awarded general contract to Charles W. Koenig, San Francisco, for a one-story plant, to cost about \$25,000 with equip-

ment. E. A. Neumark, 340 Kearny Street, is architect.

Southern Sierras Power Co., Riverside, Cal., has plans for a power substation at Las Vegas, Nev., for service in connection with Hoover Dam project, to cost \$250,000 with equipment. Work is under way on a new transmission line. Company engineering department is in charge.

Board of Education, Medford, Ore., is considering installation of man-training equipment in new two-story high school to cost close to \$200,000, for which bids will soon be asked on general contract. Frank C. Clark, Medford, is architect; Knighton & Howell, United States Bank Building, Portland, are associate architects.

Tucson Gas, Electric Light & Power Co., Tucson, Ariz., has plans for extensions and improvements in steam-operated electric power plant, including installation of Diesel engine unit and auxiliary equipment, to cost over \$300,000. Company engineering department is in charge.

Pioneer Sand & Gravel Co., 901 Harrison Street, Seattle, has awarded general contract to General Construction Co., Colman Building, for new distributing plant, including conveyor tower platform, crane platform and mechanical-handling facilities, to cost about \$50,000.

Canada

WORK will be started at once by Tremco Mfg. Co. (Canada), Ltd., 393 East 131st Street, Cleveland, local representative, W. H. Reid, 81 Victoria Street, Toronto, on first unit of a plant at Leaside, Ont., for manufacture of waterproofing, caulking and glazing compounds. Bids are being received by Marani & Lawson, architects, 38 Bloor Street West, Toronto. Project will represent an expenditure of between \$350,000 and \$400,000.

Lodge Motor Co., Detroit, has secured factory building at Walkerville, Ont., and is installing equipment for manufacture of motors. Company will carry on machining operations on a number of parts; other parts will be imported from Detroit or procured in Canada.

Cherry Burrell Corp. of Canada, Ltd., 502 Canadian Rail & Harbor Terminals Building, Toronto, manufacturer of dairy machinery, etc., will remove main plant and headquarters from Toronto to Brockville, Ont., where company has operated a branch plant for several years.

General Smelting Co. of Canada, Ltd., recently incorporated with a Federal charter, will establish a plant at Hamilton, Ont., on site leased from Steel Co. of Canada, Ltd., and a building is now in course of erection. J. N. Pomeroy, vice-president of American company, with headquarters at Philadelphia, is president of Canadian company. Company will refine zinc from dross and later will treat other metals.

Anthese Foundry, Ltd., 64 Jefferson Street, Toronto, has secured site at East Calgary, Alta., and is contemplating erecting a foundry.

F. T. Daly, whose foundry on Northern Avenue, Vancouver, B. C., was recently destroyed by fire, has secured a site on Lulu Island, and will rebuild at once. Company's tinsmith shop will continue in its present premises at 359 East Broadway, Vancouver.

Foreign

PLANs have been approved by Public Works Department, Government of Hungary, Budapest, for electrification of Hungarian section of Budapest-Vienna Railway and work will be started soon. Ministry Department, Government of Austria, is planning for similar electrification of section of railroad in that country to Vienna.

General Motors of Australia, Ltd., Sydney, has acquired plant and business of Holden's Automobile Body Co., capitalized at \$5,500,000, with main works at Sydney, and will continue operation as a subsidiary. Car bodies will be made for different cars of General Motors organization.

A railroad company in England has authorized expansion and improvements to cost about \$50,000,000, including line extensions, shops, buildings, etc. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference United Kingdom No. 1160.

Bureau of Yards and Docks, Navy Department, Washington, is planning erection of new aircraft works at Pearl Harbor, T. H., including engine shop, repair and reconditioning shop and other departments, to cost over \$200,000. Bids will be asked soon.

Board of Electricity Commissioners, Edinburgh, Scotland, is arranging for electric power development in southern part of country. Project will include construction of five new hydroelectric power plants at Tongland, Glenlee, Kendoon, Carsfad and Earlstoun, to be operated by Galloway Water Power Co., and building of transmission lines for distance of 150 miles, with seven primary switching and power substations. Entire development will cost \$13,468,800.

New Trade Publications

Chain-Block.—Herbert Morris Crane & Hoist Co., Ltd., Niagara Falls, Canada. Eight-page illustrated booklet featuring the "Master-Gear" block. Lubrication is concentrated by applying the requisite lubricant for all main bearings at one point.

Arc Welders.—General Electric Co., Schenectady, N. Y. Bulletin GEA-1031B illustrates and describes several models of resistor arc welders suitable for use with 60-volt, constant-potential arc-welding generators, 200-275-volt supply circuits (mining service) and 400-650-volt circuits (electric-railway work).

Oil Circuit Breakers.—General Electric Co., Schenectady, N. Y. Seven-page bulletin GEA-959B, illustrated, dealing with type FKR-155 indoor oil circuit breakers for moderate and heavy-duty service at any altitude.

Flow Meter.—Brown Instrument Co., Philadelphia. A novel illustration in the form of a card with moving parts, featuring the inductance-bridge principle applied to flow meter design.

Brass Rods.—Titan Metal Mfg. Co., Bellefonte, Pa. Circular describing the Nitanny free-turning brass rods, designed to meet the most rigid specifications for brass screw machine rods.

Unit Heaters.—Buffalo Forge Co., Buffalo. Bulletin of 19 pages, illustrating and describing several types of unit heaters, suitable for any steam pressure from 2 lb. to 250 lb.; also gas unit heaters for industrial use.

Create Unemployment Fund

Rochester Plants Adopt Plan Which Will Pay Benefits
to Idle for Six to 13 Weeks

AN unemployment benefit plan providing a permanent fund, built up from appropriations of 2 per cent of the annual payroll of participating companies and supplemented with 1 per cent salary contributions by employees in periods of emergency, has been adopted by 14 manufacturers in Rochester, N. Y. All but two are members of the Industrial Management Council of Rochester, under the auspices of which the plan was developed.

Adherents of the "Rochester Unemployment Benefit Plan," as it is called, are Eastman Kodak Co., Davenport Machine Tool Co., Consolidated Machine Tool Co., Gleason Works, Yawman & Erbe Mfg. Co., Taylor Instrument Co., Vogt Mfg. Co., Cochrane Bly Co., Bausch & Lomb Optical Co., Stromberg-Carlson Telephone Mfg. Co., Rochester Telephone Corp., Todd Co., Sargent & Greenleaf Co. and the Pfaudler Co. Other Rochester manufacturing companies are considering participation.

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Extensions will take the form of a two-story annex to the present buildings, making it possible to accommodate eight freight cars at one time for the loading and unloading of shipments. The latest material-handling devices will be installed.

The Ajax Metal Co. has organized a new subsidiary, the Ajax Electric Co., Inc., which will develop and exploit electric resistance heating equipment. The Electric Resistance Furnace Co., Ltd., of Great Britain, subsidiary of the Electric Furnace Co., Ltd., has developed an extensive line of such equipment which will be introduced in this country by the Ajax Electric Co. The Electric Furnace Co., Ltd., has long been associated with the Ajax Metal Co. and the Ajax Electrothermic Corp. The plant of the Ajax

Electric Co. will be at Frankford Avenue and Allen Street, Philadelphia, just opposite the main plant of the Ajax Metal Co. Officers of the new company are: G. H. Clamer, president; William Adam, Jr., vice-president; John E. Haig, secretary, and E. Allan Ginkinger, treasurer.

The Ajax Electrothermic Corp., the division of the Ajax Metal Co. which manufactures the Ajax-Northrup high-frequency coreless induction method of heating, has from the beginning operated as a separate company, but largely controlled by the Ajax Metal Co. The Ajax-Wyatt Division, which has manufactured the Ajax-Wyatt submerged resistor induction type furnace, has been operated as a department of the metal company.

It is now intended to divorce the Ajax-Wyatt Electric Furnace Division and, accordingly, a separate company, under the name of Ajax Electric Furnace Corp., has been organized to carry on the activities in the line of submerged resistor induction electric furnaces. The following officers were elected: G. H. Clamer, president and general manager; James R. Wyatt, vice-president in charge of manufacturing and development; Henry Gieseke, secretary; E. Allan Ginkinger, treasurer. The company will occupy its newly completed building on Frankford Avenue near the main plant of the Ajax Metal Co.

British Pig Iron Industry

Urges Prohibition of all Imports

(By Cable)

LONDON, ENGLAND, Feb. 23.

THE pig iron industry is in a serious condition, with only 76 furnaces in blast at the end of December compared with 162 operating at the close of 1929.

As a result, a further appeal has been made to the Government for intervention, taking the form of a letter and memorandum addressed to the Board of Trade by Sir Francis Joseph, chairman, Central and Basic Iron Producers' Associations.

The letter states that unless the Government takes action at once, collapse of the industry is inevitable. In spite of an alarming decrease in pig iron production, stocks at furnaces are greatly increased, and have become a crippling burden.

Increase in stocks has occurred despite substantial reductions in prices. Although vast sums have been spent in reorganization, the most efficient furnaces are unable to dispose of their output.

The letter concludes with an appeal for severe limitation or absolute prohibition of imports of iron and steel.

Domestic railroads have placed orders with Northeastern producers for 16,000 tons of rail chairs. Consequently the tone of pig iron has improved temporarily and Cleveland furnaces are expecting increased sales.

Continental iron is still arriving,

Chinese Government decides to use "Skoda" locomotives as standard railroad equipment.

* * *

Soviet Union buys 28 locomotives in Germany.

* * *

Krupp develops new 15-ton motor truck, which tows two loaded 10-ton trailers.

* * *

American aircraft output declined 45 per cent in 1930, but exports decreased only 4.3 per cent and reached 29 new markets.

livery delays on new orders are beginning to be extended. Buying here is still at a low ebb, and prices generally are maintained.

Tin plate inquiry is broadening, but business is quiet. Developments in the tin market are watched by buyers and further rises in price may influence consumers. Meanwhile tin plate makers are preparing to close as orders are completed, so that output is likely to be seriously diminished in the near future.

The Gyrnos Tin Plate Works at Ystalyfera has issued a 28-day notice that employment will subsequently be on a day to day contract basis.

Galvanized sheet makers have reaffirmed their prices and the market is still quiet. Black sheet demand is limited to small lots of the heavier gages.

The Chinese Northern Railway and the Chinese Government have agreed to adopt locomotives made by the Skoda Works as standard for future contracts.

The Rumanian Government is endeavoring to combine all iron and steel plants into one corporation.

German production in January was 603,000 tons of pig iron with 61 furnaces in blast at the end of January. Raw steel output was 773,000 tons and rolled steel production, 540,000 tons. The German Ruhrort-Meiderich works has closed this week having been unable to reach an agreement

but imports are likely to diminish in the near future, as new business is almost entirely lacking.

Hematite iron is moving rather more freely and makers' stocks are decreasing.

Finished steel is dull with mills in need of shipbuilding orders, and output at a low level.

Export demand is broadening in small lots indicating low stocks abroad, which is compelling replacement. Bulk orders, however, are entirely absent.

The Continent reports better demand from India and China, as a result of lower ocean freights, and de-

British and Continental European Export Prices per gross ton, f. o. b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.8665 (par)

British Prices, f. o. b. United Kingdom Ports

Ferromanganese, export.	£9 0s.	to £11 5s.	\$43.74 to \$54.75
Billets, open-hearth....	5 7½	to 5 10	26.12 to 26.76
Black sheets, Japanese specifications.....	11 10		55.95
Tin plate, per base box..	0 15½	to 0 15¾	3.77 to 3.80
			Cents a Lb.
Steel bars, open-hearth..	7 15	to 8 5	1.69 to 1.79
Beams, open-hearth....	7 7½	to 7 17½	1.60 to 1.71
Channels, open-hearth...	7 12½	to 8 12½	1.66 to 1.87
Angles, open-hearth....	7 7½	to 7 17½	1.60 to 1.71
Black sheets, No. 24 gage	8 10		1.84
Galvanized sheets, No. 24 gage.....	11 0		2.42

Continental Prices, f. o. b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.....	£2 10s.	to £2 12s.	\$12.15 to \$12.64
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Billets, Thomas (nominal)	£3 10s.	to £3 11s.	\$17.01 to \$17.25
Wire rods, low C., No. 5			
B.W.G.	5 2½	to 5 7½	24.94 to 26.15
Rails, light.....	6 0		29.20
Black sheets, No. 31 gage, Japanese.....	11 5	to 12 12	54.68 to 55.32
			Cents a Lb.
Steel bars, merchant....	4 0	to 4 2	0.87 to 0.88
Beams, Thomas, British standard (nominal) ..	3 11	to 3 12	0.79 to 0.80
Channels, Thomas, American sections.....	5 12	to 5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over ½-in. thick.....	3 19	to 4 0	0.85 to 0.86
Angles, Thomas, 3-in....	4 1	to 4 3	0.87 to 0.89
Hoop and strip steel over 6-in. base.....	4 10	to 4 11	0.96 to 0.97
Wire, plain, No. 8 gage.	5 12½	to 5 15	1.24 to 1.27
Wire, barbed, 4-pt. No. 12 B.W.G.	9 7½	to 9 10	2.03 to 2.09
Wire nails, base.....	5 17½	to 6 0	\$1.29 to \$1.30
			a keg

with employees for a 20 per cent reduction in wages.

The Soviet Union has placed an order for 28 locomotives, valued at 2,000,000 m. (\$476,000) with Orenstein und Koppel, in Germany.

Austrian output last year was 287,000 tons of pig iron and 450,000 tons of raw steel.

Exports are estimated at 20 to 25 per cent below the 1929 total.

Bolt and Nut Prices Lower

HAMBURG, GERMANY, Feb. 10.—With substantial orders for bolts and nuts being placed by American distributors and consumers with European makers, it is of interest that keen Continental competition is bringing declining prices. Total European exports of bolts, nuts and rivets last year are estimated to have declined more than 16 per cent. On recent transactions hexagonal bolts with nuts have been quoted at £7 12s. 6d. a ton (\$1.68 a 100 lb.) for 1-in.; £10 10s. a ton (\$2.31 a 100 lb.) for 1½-in.; and £15 10s. a ton (\$3.41 a 100 lb.) for 2-in. Carriage bolts and nuts with American round heads are quoted at £33 (\$7.27 a 100 lb.) for 1½-in.; £24 a ton (\$4.29 a 100 lb.) for 5/16-in.; and £16 (\$3.52 a 100 lb.) for 3/8-in. Coach screws, 3/8-in. and 1/2-in. assorted are £18 a ton (\$3.97 a 100 lb.) All prices are based on packing in cases, kegs or double gunny sacks.

European Car Cartel Forms Banking Division

HAMBURG, GERMANY, Feb. 10.—While dissolution of the Continental Railway Car Cartel has been avoided, the cartel is not in a strong position, as its membership includes only about 55 per cent of the European builders, and competition from outsiders is keen. To aid in meeting this outside competition, the cartel decided at the recent meeting in Paris to organize as a limited company with a banking division for financing export business. It is planned to extend credits up to 18 months to foreign railroads.

German-Type Gas Holder Bought By Paris

HAMBURG, GERMANY, Feb. 10.—The City of Paris has contracted with August Kloenne, Dortmund, Germany, through French licensees, for a waterless gas holder of about 3,500,000 cu. ft. capacity. This is the fifth Kloenne gas holder ordered in France since license was granted by the maker.

Allis-Chalmers Mfg. Co.'s unfilled orders on Feb. 1 amounted to \$12,136,000, a decrease of \$866,000 from the total reported on Jan. 1. Unfilled orders were \$13,091,000 on Feb. 1.

German Export Prices for Typewriters Increasing

HAMBURG, GERMANY, Feb. 10.—A total of 80,859 typewriters were exported by Germany in 1930, compared with 95,849 in 1929, and 75,351 in 1928. German typewriter exports were only 3655 machines in 1913, but reparations deliveries have introduced the German product in many new markets. In both 1929 and 1930 American typewriter manufacturers supplied about 80 per cent of foreign requirements. It is noteworthy that the average value of German typewriters exported has shown a steady increase from 188 m. (\$44.56) in 1928 to 206 m. (\$48.82) in 1929 and 211 m. (\$50) in 1930.

Krupp Offers 15-Ton Truck With 10-Ton Trailers

ESSEN, GERMANY, Feb. 11.—Production has been started by the Friedrich Krupp A. G., of a new design of 15-ton motor truck, which can tow two 10-ton trailers when loaded to capacity. The new truck, developed by Herr Flettner, who invented an automatic helm, which is used on about 90 per cent of German ships, and who constructed the less successful rotor ship, is light in weight and driven by a high-powered motor. Orders have already been booked for the new truck, although it will be exhibited for the first time at the coming Motor Car Show in Berlin.

American Steel Leads in Venezuelan Purchases

WASHINGTON, Feb. 24.—With extensive progress in public works and port improvement in Venezuela under direction of General Juan Vicente Gomez, former president, coming to the attention of the public, it is noteworthy that iron and steel purchases by Venezuela range from 80,000 to 125,000 tons annually and are principally from the United States.

Imports in 1929, says the United States Trade Commissioner at Caracas, totaled 121,940 tons of iron and steel, valued at \$12,721,676, compared with 122,504 tons, valued at \$12,082,938, in 1928. Of the 1929 imports of iron and steel, 64,894 tons, or 53 per cent, came from the United States.

The chief buyers in Venezuela are the petroleum industry and the Government, the latter's requirements being chiefly for public works. The largest purchases are of pipe, including oil well casing and line pipe, water and sewer installations. Competition for the Venezuelan trade is keen and European quotations are usually lower than the prices of American companies.

An obstacle to increased use of United States products is that building methods in Venezuela differ from the American practice. Importers

complain of the weight of many American products, which increases the price and duty imposed. An important factor, however, is the promptness with which deliveries are made from the United States.

Sheet Production Gained 15 Per Cent in January

Production of steel sheets by independent mills increased 15 per cent in January over December, and shipments gained 18 per cent over those of the previous month, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers. Production was 167,865 tons, compared with 145,125 tons in December, and shipments were 170,379 tons, against 144,040 tons during the previous month. However, sales, which increased sharply in December, largely due to orders from the motor car industry for sheets for its requirements for the first few weeks of the current year, fell off considerably, although in volume they exceeded those in October and November.

Sales for the month were 180,863 tons, against 233,289 tons in December. Unfilled orders on Feb. 1 showed a slight decline, having been 360,479 tons, against 378,601 tons on Jan. 1. The January report and comparison in net tons follow:

	Jan- uary	Decem- ber	Novem- ber
Sales	180,863	233,289	135,682
Production	167,865	145,125	145,550
Shipments	170,379	144,040	158,182
Unfilled orders	360,479	378,601	295,282
Unshipped orders	92,789	100,961	85,248
Unsold stocks	87,496	83,629	96,248
Capacity per month	551,200	539,800	504,600
Percentage reporting	67.6	67.6	67.6

Percentages, based on capacity			
Sales	48.6	63.9	39.8
Production	45.1	39.8	43.6
Shipments	45.7	39.5	46.4
Unfilled orders	96.8	103.8	86.6
Unshipped orders	24.9	27.7	25.9
Unsold stocks	23.5	22.9	28.2

British January Outputs Make Poor Showing

LONDON, ENGLAND, Feb. 20 (By Cable).—January pig iron output was 337,200 gross tons and the steel ingot and castings production was 402,200 tons. The pig iron total is less than the 349,800 tons for December while the steel exceeds that for the previous month. The January totals are both less than the 1930 monthly averages as shown by the following table:

	Pig Iron	Steel
1913	855,000	638,600
1928	550,800	710,000
1929	631,600	804,600
1930	516,400	608,200
1931, Jan.	337,200	402,200

Maschinenfabrik Weingarten of Weingarten, Württemberg, Germany, represented in North America by the Schatz Mfg. Co., Poughkeepsie, N. Y., will have an extensive exhibit of metal-working machinery at the 1931 Spring Fair to be held at Leipzig, Germany, March 1 to 11.

Scheduling of Production Stabilizes Employment

(Concluded from page 697)

during the summer months (the time of the sales peak). In case the sales have been higher than estimated, vacations are curtailed; in case they have not been up to the estimate, vacations are increased.

Determination of the amount of stock to be carried at all times of the year is the fourth step. The minimum stock is carried at the end of the busy season. Estimates are made of the normal stock to be carried each month, with this as the starting point. Stocks are built up during the slack season and reduced during the busy season. We know just how much stock to plan for at all times of the year, and storage facilities are provided accordingly.

Close Production Control Afforded

These four steps give a brief description of the production control on finished goods. It is adapted to fit each particular product and is used in planning the production of an individual product or to control the production of an entire department. It is frequently necessary to accumulate more than the normal stock of a few large-selling products, when there are small orders coming through for special products which cannot be stocked. In this way the large stocks will consist only of those products which may be called the "bread-and-butter" lines.

When the seasonal variation has been eliminated from the production of finished products, it becomes a simple matter to schedule the supply of parts and semi-finished products throughout the plants. We establish maximum and minimum stock limits within which the stock of semi-finished products may fluctuate, maintaining all the time a constant rate of production.

Average Lay-Offs Have Been Only 2 Per Cent

What have been the results of this program? At the Kodak Park Works, during the eight years from 1922 through 1929, the number of employees laid off on account of lack of work averaged only 2 per cent of the force. During this period the highest lay-off in any one year was less than five per cent of the force and the lowest 0.7 per cent. The company has thus been able to give steady employment to workers, and both the company and the employees have benefited.

By having production uniform throughout the year it is not necessary to have so large an investment in plant and equipment. If we had a plant large enough to meet the peak sales, our investment would be much higher and much of the equipment would be idle during the slack sales season. This saving in carrying charges on the plant much more than offsets the additional carrying charge due to higher inventories during the slack season and the larger storage facilities.

Without this uniform production it would also be necessary to have highly trained operators busy during a few months, and for whom there would be no work during the remainder of the year. We can get increased output from the worker who is engaged all the year, as compared with one who would work only part of the year. In normal times, therefore, this

method has enabled the company to produce at a lower cost and the employees have had steady work.

Can More Easily Cope with Depression

This method is designed primarily to eliminate the effects of the seasonal variation in sales of our products. We have found, however, that we are also in a better position to meet business depressions. An organization has been built up to assemble the facts, to make forecasts of sales, and to control production and stocks. We cannot expect to escape the effects of a world-wide depression, but by means of this organization and through careful planning we can minimize the effects of these depressions upon employees.

During the first part of 1930 there were more employees at Kodak Park Works than in 1929. When the effects of the depression were felt in the summer of 1930, and it became necessary to curtail production, a number of departments were put on a five-day week. In a few cases, a shorter week has been necessary. Lay-offs have been kept at a minimum and during 1930 only 2½ per cent of the workers engaged in production have been laid off—only slightly more than during normal years. This compares with lay-offs of 14 per cent in 1921, before the present plan was in effect.

Development of Steel Wing Beams for Aircraft

(Concluded from page 710)

Heat-treated steel wing beams are particularly suited to use on large aircraft. With greater beam depth available, the open truss type construction becomes increasingly necessary from a weight standpoint and in the design of the individual members a tubular shape is of great advantage. Monoplane wings are deservedly popular on transport ships, and steel beams will undoubtedly be more widely used. The mono-spar design, in which a single spar replaces the conventional front and rear spars, is of great interest in this connection because of the possibilities of reducing the torsional deflections of monoplane wings. The mono-spar concentrates the bending and compression loads and allows effective use of more material in the members, thus reducing somewhat the use of the thinner gages of metal which have a greater tendency to secondary failures.

The tendency toward the use of high-strength heat-treated steels is pronounced and widespread. Steels are available which are capable of ultimate strengths from 250,000 to 300,000 lb. per sq. in. and corresponding yield points from 200,000 to 260,000 lb. per sq. in., with elongation values in 1/10 in. sheet of 6 to 12 per cent. Medium-carbon chrome-molybdenum, chrome-vanadium and chrome-nickel-molybdenum steels are suitable for these purposes in sheet and tube form. These strength values would be employed only in large members having relatively thick sections. With such designs and materials, welded joints might be replaced by heat-treated bolts or perhaps rivets.

These steels have strength-weight values much in excess of duralumin and compare with the fabled values of beryllium but with the difference that they are available today, and at a very reasonable cost.

Business as Others See It

Digest of Current Financial and
Economic Opinion

SLOW, halting and mixed improvement in business and industrial conditions is seen by most of the competent observers. That January made its customary seasonal expansion is the verdict of some—but not all. That individual industries showed a diversity in their movements, and will continue to do so, is generally accepted.

But one and all find a continuing improvement in business sentiment. The National Industrial Conference Board considers this, together with actual physical gains, to "indicate an upward trend." A "spirit of reserved optimism" impresses others, who find a "statistical evidence of improvement, together with the more intangible increase in confidence, to indicate that the trend of business is turning."

Congressional Acts Feared

Partly, but not wholly, offsetting these expressions of moderate optimism lies the overshadowing specter of bonus legislation. *Analyst* believes that this "amply justifies apprehensions of evil effects on the business situation. . . . It illustrates the willingness of politicians to thrust upon a country, for their individually

political benefits, measures of broadly detrimental economic effect."

Consumption has definitely exceeded production for some time, in the view of Union Trust Co., Cleveland. The result is "an accumulated demand for goods." In 1930, the American public bought from day to day the ordinary necessities of life. In some particulars, the bank finds, we bought more than in 1929: "Chain stores showed an increase in tonnage of merchandise distributed."

Buying Power Well Held

That bank feels that the generally maintained wage rates for "at least 75 per cent of the persons normally gainfully employed," together with the reduction in prices and in cost of living, "may well offset to a great extent the decreased purchasing power of the unemployed, in terms of volume of merchandise sold."

Retail trade is found to be "lively," after the price-cutting operations of the past few months. Brookmire lays partial responsibility for the present depressed condition in industry to the "changes in price relationships. . . . The question [now] is, whether wholesale prices are to be

brought up to parity with other prices, or whether other prices are to be readjusted downward in accordance with the new level of wholesale prices." The latter is thought more probable.

Our grandfathers were just as slow as we "to recognize and credit a change for the better," after a depression, according to Poor's. That organization lays the current rise in stock market quotations and operations to "a return of general confidence that business is on the road to recovery."

Fair Weather Ahead, Is Belief

Harvard Economic Society finds "gradual improvement the rule," and says: "Apparently the policy of increasing operations conservatively is being followed in February, as . . . about the customary seasonal advance is taking place."

A "spring of considerable activity" is visioned by *Commerce and Finance*, as well as "a summer of cheerfulness." The latter is predicated, in part, on adjournment of Congress. If a satisfactory solution is found for the matter of the silver requirements of the Orient, Mr. Price sees "a boom sooner than even the optimists now expect."

Rustless steels are destined for an important place in aircraft. High strengths of 150,000 to 200,000 lb. per sq. in. are being developed in present materials. In some instances this is obtained by cold work of thin strip, in which case there is much difficulty in forming and fabricating operations. But rustless steels are becoming available which may be fabricated in the annealed condition, and then heat treated to strengths comparable with chrome-molybdenum steel.

With such types of steel available, and with proper facilities for heat treatment in operation, the design and construction of heat-treated steel wing beams is without question a major trend in aircraft manufacture.

Methods for Scheduling Plant Maintenance

(Concluded from page 691)

zation. This would usually be a notice to start new work or a confirmation of a verbal order. In either case the form used should be the same and would preferably be in the form of a tag which could be returned by the assignee on completion of his particular function.

Here, again, there should be certain definite essentials and also other things which would vary with the form and size of the organization. First and very important, there should be two serial numbers of au-

thorization, one for construction—fixed capital, additions, betterments or replacements—and one for maintenance or repairs. Incidentally, whether these numbers would be issued by the department in which the control board is maintained or by some section of the accounting or other departments, the above work record should be kept in separate parts, one part for construction and the other for maintenance. The work order for construction could be called a "C.O.," the maintenance an "M.O." or the use of "C" and "M" prefixes could be adopted.

Fig. 3 is a common form used for these purposes. Of importance are the summary schedule on the reverse side and the estimated cost, assignments and completion dates on the face of the form. The setting up of the summary schedule will always indicate the extent of coordination of functions and if there is any possible error in schedule arrangement. If actual charges or possibly commitments are collected under the above numbers in the accounting or cost department through a job ledger, then the estimated cost and the detail supporting this estimate can be paralleled, for comparison purposes, against the cost figures.

When each function is completed, the work order ticket will be returned and the card removed from the board. In large organizations check-up can be made by men who will report on each job at definite periods. In this way the schedules on the board will be corrected and maintained up to date.

THE IRON AGE

March 5, 1931



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A BLESSING—IF USED MODERATELY

A DIET consisting wholly of information in tabloid form soon produces mental indigestion, by providing too little information on too many subjects.

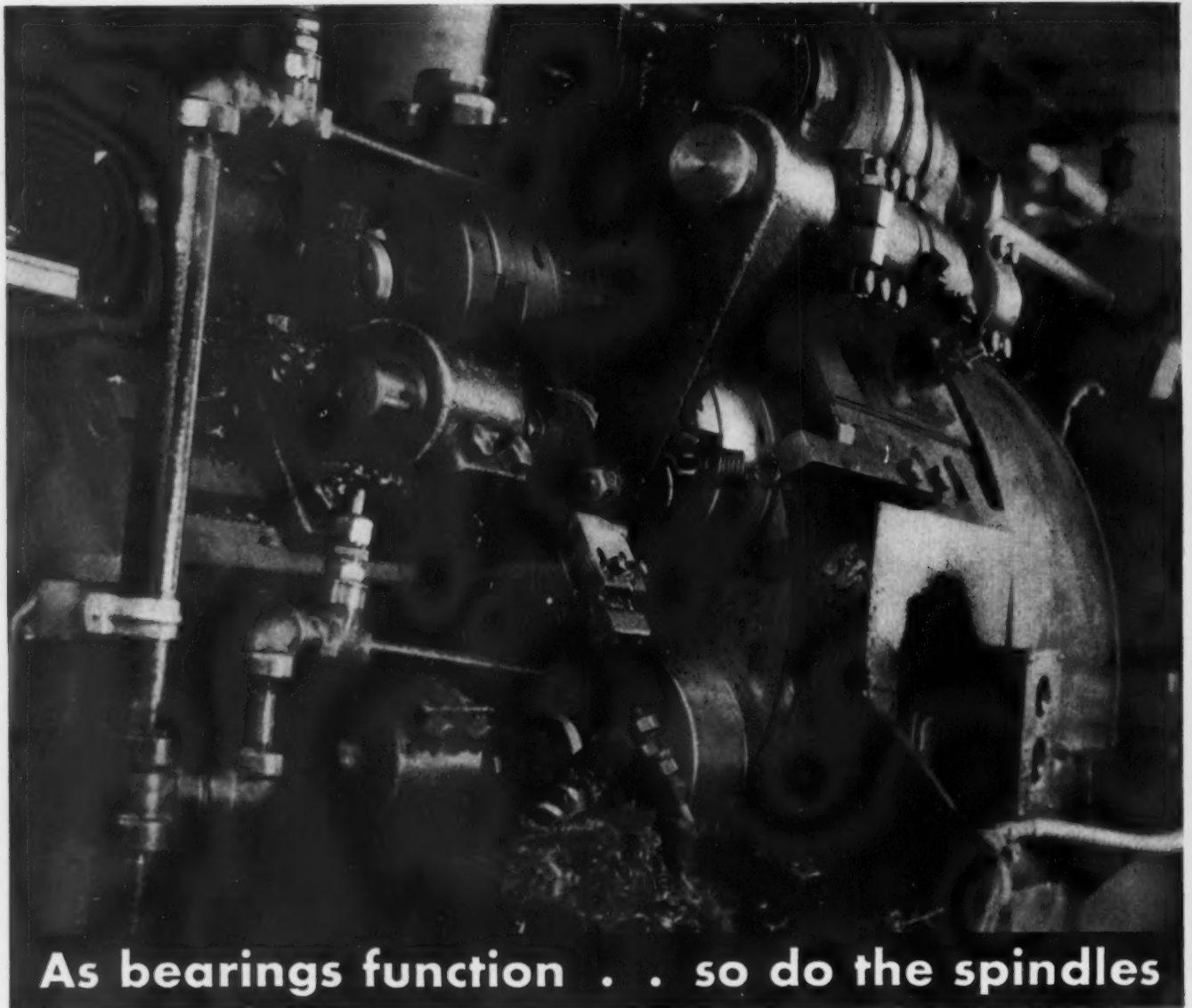
But, taken in proper doses, tabloids serve a useful purpose. They are time-conservers. They help guard against the loss of ideas that may be used to advantage. They enable you to keep informed of the major developments in fields impinging lightly on your own.

For your convenience THE IRON AGE employs tabloids generously. "This Issue in Brief," on the following page, is a bird's-eye view of the feature articles. Embodied in most of the articles themselves (in large, bold-face type) are "show windows" through which you can see what is in the article itself.

The outstanding market developments of the week in iron and steel are summarized on the first page of the green section (page 799). A thumbnail report on the machinery markets appears on page 826. The half-page digest on the last editorial page gives the highlights of current financial and economic opinion.

Multum in parvo.—A. H. D.

76th
IRON AGE
YEAR



WITH future speed limits uncertain, machine buyers are naturally super-critical today. No machine can be fast whose bearings are sluggards. Hence, you find New Departure Ball Bearings on the spindles of these faster machines . . . and elsewhere, too, in the lesser works, because New Departures are known everywhere for their efficiency at higher speeds . . . because they are rigid, accurate and long-lived . . . because they are better able to cope with whatever the future may bring. The New Departure Mfg. Company, Bristol, Connecticut.

18/96

NEW DEPARTURE BALL BEARINGS

THIS ISSUE IN BRIEF

MARCH 5, 1931

NEXT WEEK

CAN the low buying power of low wage workmen in backward industries support the earnings of labor in so-called high-wage industries? Wages per man are not a true measure of costs. High wages are justified so long as man-hour costs are kept down. A misconception of the meaning of unit costs at the present juncture will delay the return of true prosperity, which demands an equitable distribution among management, investors, employees and the public of the savings accruing from advances in industrial efficiency. This timely subject will be discussed in the next issue.

Business' "White Hope"

"Depression-proof" industries are anxiously sought. Electric refrigeration is the most promising of the newcomers, but in the offing are others that are spindling now but great in potentiality.—Page 757.

Foremen Are Eager Students

Once a week 267 Cincinnati foremen meet to enhance their knowledge of supervision, safety, waste elimination, etc. Employers lend needed equipment. City and state provide instruction.—Page 762.

Welding Saves Shipweight

To keep cruisers under the 10,000-ton legal limit, welding is employed generously, but not where general structural strength is involved. Almost all pipe sections are butt welded. Fittings throughout ships are welded.—Page 764.

Aluminum Paint Cuts Weight

Compared with oil paint, aluminum paint represents a considerable saving in weight. New cruisers use it as a priming coat and in some instances as a finishing coat.—Page 765.

Will Lake Ores Last 50 Years?

Yes, says Clyde E. Williams, with increase in beneficiation. Most authorities say 20 or 30 years. He sees no trend of steel-making to Atlantic seaboard, to avoid costly haulage of imported or Southern ores, but rather an acceleration in steelmaking on the Great Lakes.—Page 773.

May Save a Million Tons of Ore Annually

Improvement in ore-washing methods will save on the western Mesabi range alone, nearly all the ore now lost in the process, engineer declares.—Page 773.

Sheet Mill Output Doubled Without Adding Units

Pair and sheet furnaces are supplied with a motor-driven walking beam which acts as a conveyor. Material "walks" to and from the furnaces.—Page 776.

Steel Impact Strength Reduced Markedly by Inclusions

Investigation reveals a relation between visible inclusions and shock resistance. Chemical analyses show that visible inclusion content and impact strength are proportional to a ratio of oxidic inclusions to sulphur content.—Page 781.

Heavy Handling Costs Cut

Blanks to be forged are carried through forging furnace on hooks suspended from an endless chain over a slot in the furnace arch. Heat loss is avoided by seal formed by plates on shanks of hooks.—Page 785.

Double-deck Hardening Furnace Has Roller Hearths

The three heating zones are controlled by three panels mounted up over the furnace. Alloy rollers are sprocket-and-chain driven. Last roller is insulated so that when heat-treated part touches it warning lamps are lighted.—Page 789.

Simplifying Inventory Control

Where a standard set-up is required for a sub-assembly, one inventory card is used for all the parts in the assembly. This saves much record-keeping.—Page 768.

Inventory Cards Aid in Production Control

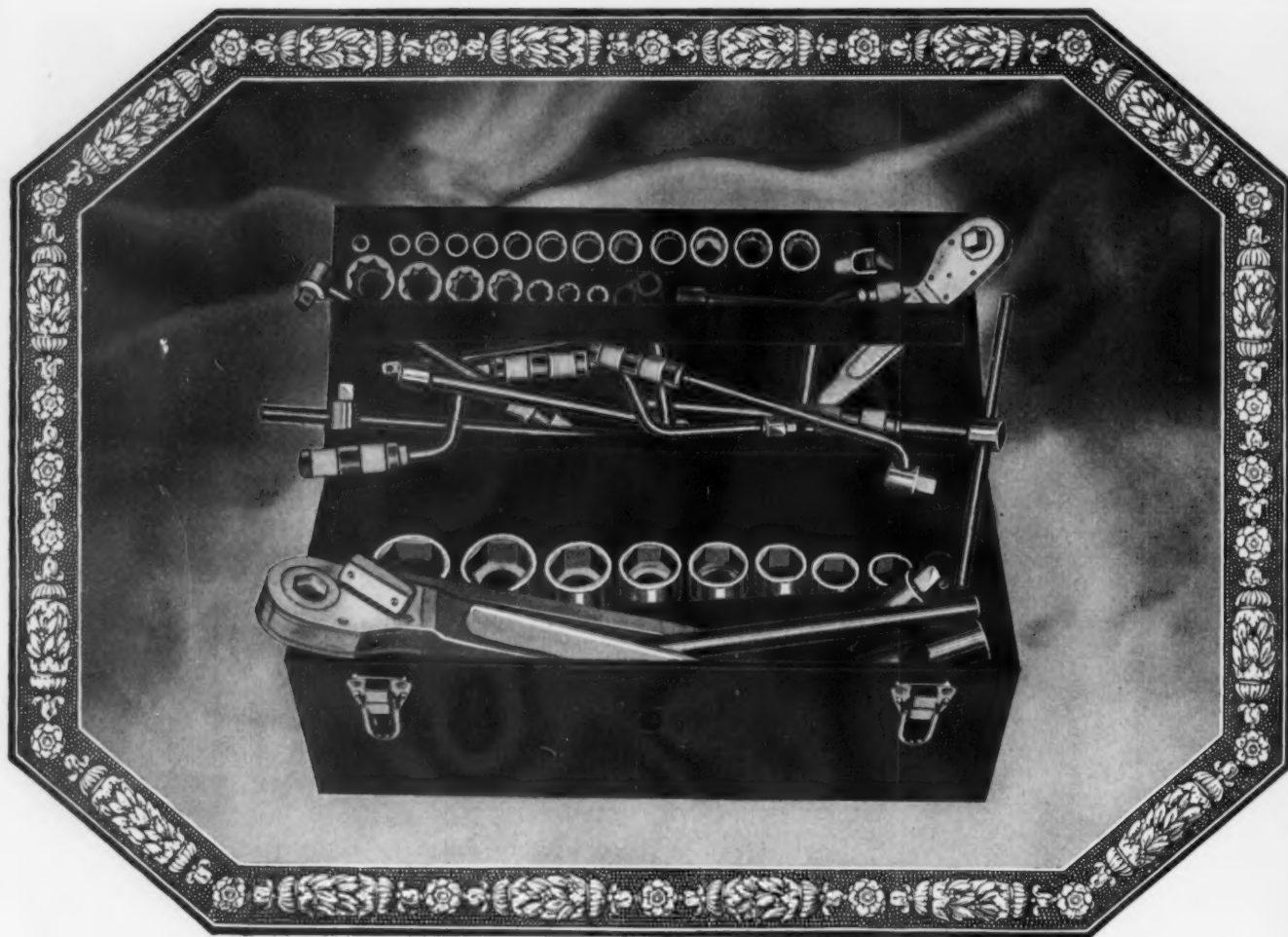
Assembly orders show progress of each order and make it possible to give accurate delivery promises.—Page 770.

Refrigerators Gained 10 Per Cent in 1930

From 1910 to 1925, only 85,000 electric refrigerators were made. In 1930 one million refrigerators were made and sold. The 1931 goal is 30 per cent higher.—Page 759.

How to Measure Steel Cleanliness

Photomicrograph is enlarged by projection on screen. Inclusions are counted with respect to length per square millimeter. This proves a satisfactory measure of cleanliness.—Page 782.



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